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SELECTED WATER RESOURCES ABSTRACTS

A Semimonthly Publication of the Water Resources Scientific Information Center, Office of Water Research and Technology, U.S. Department of the Interior

VOLUME 11, NUMBER 7
APRIL 1, 1978

W78-02701 -- W78-03200

The Secretary of the U.S. Department of the Interior has determined that the publication of this periodical is necessary in the transaction of the public business required by law of this Department. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget through August 31, 1978.

As the Nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering the wisest use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historical places, and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to assure that their development is in the best interests of all our people. The Department also has a major responsibility for American Indian reservation communities and for people who live in Island Territories under U.S. administration.

FOREWORD

Selected Water Resources Abstracts, a semimonthly journal, includes abstracts of current and earlier pertinent monographs, journal articles, reports, and other publication formats. The contents of these documents cover the water-related aspects of the life, physical, and social sciences as well as related engineering and legal aspects of the characteristics, conservation, control, use, or management of water. Each abstract includes a full bibliographical citation and a set of descriptors or identifiers which are listed in the **Water Resources Thesaurus.** Each abstract entry is classified into 10 fields and 60 groups similar to the water resources research categories established by the Committee on Water Resources Research of the Federal Council for Science and Technology.

WRSIC IS NOT PRESENTLY IN A POSITION TO PROVIDE COPIES OF DOCUMENTS ABSTRACTED IN THIS JOURNAL. Sufficient bibliographic information is given to enable readers to order the desired documents from local libraries or other sources.

Selected Water Resources Abstracts is designed to serve the scientific and technical information needs of scientists, engineers, and managers as one of several planned services of the Water Resources Scientific Information Center (WRSIC). The Center was established by the Secretary of the Interior and has been designated by the Federal Council for Science and Technology to serve the water resources community by improving the communication of water-related research results. The Center is pursuing this objective by coordinating and supplementing the existing scientific and technical information activities associated with active research and investigation program in water resources.

To provide WRSIC with input, selected organizations with active water resources research programs are supported as "centers of competence" responsible for selecting, abstracting, and indexing from the current and earlier pertinent literature in specified subject areas.

Additional "centers of competence" have been established in cooperation with the Environmental Protection Agency. A directory of the Centers appears on the inside back cover.

Supplementary documentation is being secured from established discipline-oriented abstracting and indexing services. Currently an arrangement is in effect whereby the BioScience Information Service of Biological Abstracts supplies WRSIC with relevant references from the several subject areas of interest to our users. In addition to Biological Abstracts, references are acquired from Bioresearch Index which are without abstracts and therefore also appear abstractless in SWRA. Similar arrangements with other producers of abstracts are contemplated as planned augmentation of the information base.

The input from these Centers, and from the 51 Water Resources Research Institutes administered under the Water Resources Research Act of 1964, as well as input from the grantees and contractors of the Office of Water Research and Technology and other Federal water resource agencies with which the Center has agreements becomes the information base from which this journal is, and other information services will be, derived; these services include bibliographies, specialized indexes, literature searches, and state-of-the-art reviews.

Comments and suggestions concerning the contents and arrangements of this bulletin are welcome.

Water Resources Scientific Information Center
Office of Water Research and Technology
U.S. Department of the Interior
Washington, DC 20240

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02 WATER CYCLE
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03 WATER SUPPLY AUGMENTATION AND CONSERVATION
Includes the following Groups: Saline Water Conversion; Water Yield Improvement; Use of Water of Impaired Quality; Conservation in Domestic and Municipal Use; Conservation in Industry; Conservation in Agriculture.

04 WATER QUANTITY MANAGEMENT AND CONTROL
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ABSTRACT SOURCES

SELECTED WATER RESOURCES ABSTRACTS

2. WATER CYCLE

2A. General

STREAMFLOW SIMULATION-A MODEL BASED ON CANNONICAL EXPANSIONS,
Indian Inst. of Tech., New Delhi. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2E.
W78-02790

RUN-SUMS OF ANNUAL FLOW SERIES,
Technical Univ. of Istanbul (Turkey). Dept. of Hydraulic and Water Power.
For primary bibliographic entry see Field 4A.
W78-02792

A PARAMETRIC APPROACH TO STATION WEIGHTS,
Indian Inst. of Tech., Kanpur. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2E.
W78-02793

TESTING THE EFFICIENCY OF ALGORITHMS AND STRATEGIES FOR AUTOMATIC CALIBRATION OF RAINFALL-RUNOFF MODELS,
Papua and New Guinea Univ., Port Moresby (New Guinea). Dept. of Geography.
G. Pickup.
Hydrological Sciences Bulletin, Vol 22, No 2, p 257-274, June 1977. 7 fig, 3 tab, 15 ref.

Descriptors: *Calibrations, *Model studies, *Rainfall-runoff relationships, Hydrology, Runoff, Simulation analysis, Computer models, Computers, Computer programs, Algorithms, Mathematical studies, *Automatic calibration, *Rainfall-runoff models, Boughton model, Nonlinear programming algorithms.

The efficiency of various methods of calibrating a rainfall-runoff model was examined. The model used was a 12 parameter version of the Boughton model which has been developed for large tropical basins. Attempts were made to improve the efficiency of calibration in three areas: selection of the best nonlinear programming algorithms; reduction of the number of objective functions required for calibration; and simplification of the model structure. The best algorithms were found to be those of Powell, Rosenbrock, and the simplex method of Nelder and Mead. The Davidon method did not perform well. The number of objective function evaluations can be reduced by performing a sensitivity analysis on the model and by selecting a small group of parameters which are not interdependent and which the objective function is sensitive to. This may yield a substantial reduction in the computer time required to calibrate the model. Simplification of the model structure also can yield substantial savings, especially where it removes calculations which are redundant and reduces the number of model parameters. (Lee-ISWS)
W78-02798

WATER BALANCE STUDIES IN THE EXPERIMENTAL BASINS OF THE UPPER HARZ MOUNTAINS,
Coblenz Federal Inst. of Hydrology (West Germany).
For primary bibliographic entry see Field 2D.
W78-02800

CORRELATION STRUCTURE AND TIME SCALE OF SIMPLE HYDROLOGIC SYSTEMS,
Swedish Meteorological and Hydrological Inst., Stockholm.
L. Gottschalk.
Nordic Hydrology, Vol. 8, No. 3, p 129-140, 1977. 7 fig, 6 ref.

Descriptors: *Runoff, *Watersheds(Basins), *Groundwater, *Model studies, Mathematical models, Rivers, Groundwater movement, Water levels, Precipitation(Atmospheric), Correlation analysis, Stochastic processes, Flow, Discharge(Water), Foreign research, Hydrology.

Correlation structure of river runoff is a complicated set of different persistence phenomena in the watershed itself and in the meteorological input to the watershed. Correlation functions and time scale of isolated processes in a watershed (groundwater level and river runoff) were derived analytically from the linearized equations of motion for these processes. Nonlinear effects on the correlation functions were shown for river runoff and for the watershed as a whole. (Sims-ISWS)
W78-02814

TOPOLOGICAL PROPERTIES OF SOME TRELLIS PATTERN CHANNEL NETWORKS,
Cold Regions Research and Engineering Lab., Hanover, NH.
For primary bibliographic entry see Field 8B.
W78-02818

BEHAVIOR AND INTERACTION OF THE PHYSICAL PARAMETERS OF SEMI-ARID AND INTERTROPICAL SLOPED BASINS, (IN FRENCH),
P. Dubreuil, M. Morell, and P. Sechet.
Cah O R S T O M Ser Hydrol 12(1), p 13-36, 1975.

Descriptors: *Semi-arid lands, Slopes, *France, Distribution, Morphology, *Climates, *Geology, *Hydrological cycle, *Vegetation, Water balance.

A study was carried out on the influence of environmental factors on the hydrological cycle. Available information was collected from about 240 representative basins operated between 1951-1970. The data were distributed into homogeneous classes in terms of climate, vegetation and geology. Climate and vegetation are linked but vegetative and geological classes are independent. When class size was not enough to supply a significant statistical analysis, an association between adjoining classes was made. An analysis of behavior was made for every physical and morphological parameter with the help of empirical distributions. Relationships between parameters were then investigated. The influence of the environment and the classification of these relationships is analyzed and discussed. Copyright 1978, Biological Abstracts, Inc.
W78-03064

COMPUTER SIMULATION OF TWO-DIMENSIONAL UNSTEADY FLOWS IN ESTUARIES AND EMBAYMENTS BY THE METHOD OF CHARACTERISTICS--BASIC THEORY AND THE FORMULATION OF THE NUMERICAL METHOD,
Geological Survey, Reston, VA. Water Resources Div.
For primary bibliographic entry see Field 2L.
W78-03130

2B. Precipitation

HOW MUCH RAIN DOES A RAIN GAGE GAGE,
Agricultural Research Service, Sidney, MT. Northern Plains and Water Research Center.
E. L. Neff.
Journal of Hydrology, Vol. 35, No. 3/4, p 213-220, November 1977. 1 fig, 1 tab, 39 ref.

Descriptors: *Rain gages, *Precipitation gages, *Rainfall, Measurement, Instrumentation, Winds, Effects, Equipment, Precipitation(Atmospheric), Correlation analysis, Regression analysis, Meteorology, Rain-gage errors, Wind effects, Pit gages.

Rain gages of various sizes and shapes have been used for hundreds of years to measure the amount of rain that actually reaches the ground surface. In this study, rainfall data from four locations for gages normally exposed with their orifices about 1 m (40 in) above ground were compared with control gages installed with their orifices at the ground surface. The normally exposed gages caught between 5 and 15% less rain for all rainfall events than did the control gages. For single rainfall events, where the total catch exceeded 12 mm (0.5 in), the error ranged between 0 and 75%, depending on wind characteristics during the storm. Attempts to develop a correction procedure based on conventional wind measurements were unsuccessful. It was concluded that the most expedient way to measure rainfall accurately in windy environments is with pit gages, which eliminate all wind effects. (Sims-ISWS)
W78-02786

STUDY ON THE ESTIMATE OF PRECIPITATION WITH THE HELP OF S-BAND AT RADAR CALCUTTA,
Regional Meteorological Center, Calcutta (India).
A. C. De, P. Bhattacharyya, and S. K. Ghosh.
Indian Journal of Meteorology, Hydrology and Geophysics, Vol 28, No 1, p 97-112, January 1977. 3 fig, 2 tab.

Descriptors: *Remote sensing, *Radar, *Precipitation(Atmospheric), Rainfall, Rainfall intensity, Storms, Tropical cyclones, Instrumentation, Equipment, Photography, Data processing, Rain gages, Meteorology, *India(Calcutta).

An attempt was made to study the amount of rainfall associated with the severe cyclonic storm of 14-16 August 1974 with the help of the S-band radar installed at Calcutta. The first two modes of the gray scale, viz, gray and white shades, were utilized in this study. It was found that these modes correspond fairly well with the rates of rainfall recorded at the self recording rain gauge stations and rainfall reported by ordinary rain gauge stations withing a radius of 200 km around Calcutta. Isogram analysis of the rates of rainfall at a particular time was made, and the results compared fairly well with the radar photographs at the corresponding time. (Sims-ISWS)
W78-02795

DESIGN OF REPRESENTATIVE AND KEY RAINGAUGE STATIONS NETWORK FOR FLOOD FORECASTING IN YAMUNA AND DAMODAR RIVERS,
Meteorological Office, New Delhi (India).
D. V. L. N. Rao, and V. K. Bhalla.
Indian Journal of Meteorology, Hydrology and Geophysics, Vol 28, No 1, p 63-73, January 1977. 8 fig, 13 tab, 8 ref.

Descriptors: *Networks, *Rain gages, *Network design, Flood forecasting, Rainfall, Precipitation(Atmospheric), Regression analysis, Design, Data collections, Hydrologic data, Planning, Stations, Measurement, Watersheds(Basins), Rivers, Hydrology, Meteorology, *Yamuna Watershed(India), *Damodar Watershed(India).

Representative rain gauge networks were determined for two selected catchments in India, and regression equations for working out estimates of areal rainfall over the catchment from the rainfall data recorded at these stations were developed. A few alternate key station networks also were indicated for yielding representative estimates of areal rainfall when data for some station in the

representative network may be missing. The stability of the various selected networks also was tested with different sets of rainfall data. It was possible to determine a small number of stations giving a multiple correlation coefficient of 0.96 and 0.98, and the regression explained about 92 and 97% of the variation in areal rainfall respectively for the two catchments. (Sims-ISWS)
W78-02797

CHARACTERISTICS OF RAINDROP CHARGE AND ASSOCIATED ELECTRIC FIELD IN DIFFERENT TYPES OF RAIN,
Inst. of Tropical Meteorology, Poona (India).
A. M. Selvam, G. K. Manohar, L. T. Khemani, and Bh. V. Ramana Murty.
Journal of the Atmospheric Sciences, Vol. 34, No. 11, p 1791-1796, November 1977. 4 fig, 4 tab, 15 ref.

Descriptors: *Raindrops, *Electrical properties, *Electric fields, Thunderstorms, Monsoons, Instrumentation, Measurement, Cloud physics, Precipitation(Atmospheric), Rainfall, On-site investigations, Data processing, Meteorology, *Raindrop charge, *India, Rainwater conductivity.

Simultaneous measurements of raindrop charge, atmospheric electric field, and rain intensity were made at Poona using fast response, continuous recording surface instruments during four types of rain: premonsoon (thunderstorm rain), monsoon rain type I (light intermittent rain), monsoon rain type II (heavy continuous rain) and post-monsoon (thunderstorm rain). Measurements also were made of the conductivity of rainwater samples collected during the monsoon season. On some days of this period, data on cloud thickness as obtained from the aircraft flights in the region also were made available. The electric field associated with negatively charged raindrops was less negative than that associated with positively charged drops. The raindrop charge spectrum showed different characteristics during the four types of rain studied. It was broadest during the pre-monsoon rain when the convective activity was a maximum. It followed a log-normal distribution during the monsoon rain type I, and it was peaked and skewed to the positive side during the monsoon rain type II. Rainwater conductivity was inversely correlated with the cloud vertical thickness. The results of the present study supported the warm cloud charge generation mechanism proposed by Takahashi. (Sims-ISWS)
W78-02802

POSSIBILITY OF IDENTIFYING PRECIPITATION FROM MICROWAVE MEASUREMENTS FROM SATELLITES,
Ye. P. Dombkovskaya, and V. V. Ozerkina.
Soviet Hydrology, Selected Papers, Vol. 15, No. 1, p 21-26, 1976. 2 fig, 3 tab, 11 ref. Translated from Transactions of the Hydrometeorological Center of the USSR (Trudy Gidromettsentra (SSR), No. 165, p 77-86, 1975.

Descriptors: *Microwaves, *Precipitation(Atmospheric), *Remote sensing, Satellites(Artificial), Rainfall, Clouds, Cloud physics, Moisture content, Model studies, Mathematical models, Radio waves, Thermal radiation, Meteorology, *Radioluminance, Microwave emission.

One of the ways of investigating the possibility of identifying precipitation zones and of quantitatively estimating the values of various meteorological elements from microwave measurements from satellites is by analyzing the results of model computations of this emission. The solution of the known radiation transport equation for conditions of pure absorption with addition of the coefficient of atmospheric attenuation produced by scattering was used to compute the intensity of the thermal radio emission of the earth-atmosphere system. The contribution of scattering (both multiple and single) to the intensity of microwave emission was disregarded. This method of computation can be used when rainfall intensity does not exceed 10 mm/hr. From this study, the following conclusions were drawn: The presence of precipitation in the atmosphere can be identified both from multichannel measurements and measurements on a single wavelength of 0.8 cm (at some angle to the nadir for vertical and horizontal polarizations). Precipitation intensity can be estimated only roughly from a visual analysis of the data (within three synoptic gradations). (Sims-ISWS)
W78-02803

LAKE-LAND PRECIPITATION RELATIONSHIPS USING NORTHERN LAKE MICHIGAN DATA,
National Oceanic and Atmospheric Administration, Ann Arbor, MI. Great Lakes Environmental Research Lab.
S. J. Bolsenga.
Journal of Applied Meteorology, Vol. 16, No. 11, p 1158-1164, November 1977. 5 fig, 6 tab, 13 ref.

Descriptors: *Precipitation(Atmospheric), *Lake Michigan, *Islands, *Great Lakes, Rainfall, Snowfall, Rain gages, Precipitation gages, Lakes, Effects, On-site investigations, On-site data collections, Monthly, Data processing, Meteorology, Climatology, *Lake-land precipitation relationships.

Data from a network of recording precipitation gages, operated over a 5-year period on islands in Lake Michigan, provided the basis for the first monthly analysis of the relationship of lake-to-land precipitation conducted on the Great Lakes. Wide monthly fluctuations in lake-to-land relationships, previously masked by seasonal analysis using storage gages, were shown. An examination of the significance of the findings indicated that all butthe largest differences are not statistically significant and that even the largest lake-land differences could possibly be attributed to gage errors. (Sims-ISWS)
W78-02807

THE EFFECT OF RAINDROP INTERACTIONS ON OBSERVED DROP SIZE DISTRIBUTIONS,
Auckland Univ. (New Zealand). Dept. of Physics.
S. D. Bradley, and C. D. Stow.
Journal of Applied Meteorology, Vol. 16, No. 11, p 1206-1213, November 1977. 7 fig, 3 tab, 20 ref.

Descriptors: *Raindrops, *Particle size, *Drops(Fluids), Rainfall, Precipitation(Atmospheric), Model studies, Mathematical models, Cloud physics, Coalescence, Evaporation, Effects, Meteorology, *Raindrop size, Drop collisions, Drop breakup, Drop coalescence.

A model for raindrop interactions incorporating satellite droplet production was used to determine drop size distributions at the ground. Assuming an exponential distribution at cloud base and using known meteorological conditions, the theoretical drop size distribution agrees well with distributions observed in the field; both predicted and observed distributions have reduced numbers of drops of radius near 0.35 mm. A time series analysis was facilitated by using a running-mean technique on each part of observed drop size distributions. A cross correlation was then performed between the time-series for large, medium, and small drop concentrations. It was found that the smallest drops are associated in time with drops having a high satellite droplet producton rate. On the other hand, the time delay at ground level between changes in large-drop concentration and small-drop concentration can be interpreted in terms of fallspeed differences. This allows the effective altitude of the active rain-producing region to be determined. (Sims-ISWS)
W78-02809

HAILSTORMS IN THE TRANSVAAL ON 29 NOVEMBER 1972,
National Physical Research Lab., Pretoria (South Africa).
A. E. Carte, and G. N. Mader.
Quarterly Journal of the Royal Meteorological Society, Vol. 103, No. 438, p 731-749, October 1977. 7 fig, 3 tab, 20 ref.

Descriptors: *Hail, Africa, *Precipitation(Atmospheric), *Thunderstorms, Storms, Weather, On-site data collections, On-site investigations, Radar, Remote sensing, Networks, Lighting, Winds, Rainfall, Weather patterns, Meteorology, *Transvaal(South Africa), Hailstones.

A broad band of non-frontal storms moved northwards across a dense hail-reporting network. The precipitation patterns of two isolated storms that produced hailstones greater than 5 cm in diameter were studied in detail. Both storms gave a burst of large hailstones, then declined in severity, and ultimately merged. Radar reflectivity structures showed both to be essentially unicellular, but one showed evidence of pulsating growth. Internal structures of several hundred hailstones from these two storms and a third less severe storm were examined. The growth centers of most were found to be rime, but a few were concluded to have been frozen drops. The layering of the hailstones, the fallout pattern on the ground, and features of the radar echoes all indicated greater complexity of the two severe storms than a single updraught that steadily built up to a maximum speed then faded out. Deuterium contents, reported in a companion paper, were determined for many of the hailstones. Storms on this day showed a spectrum of behavior; some were organized multicellular complexes. (Sims-ISWS)
W78-02812

PRECIPITATION SCAVENGING (1974).
Department of Energy, Oak Ridge, TN. Technical Information Center.
For primary bibliographic entry see Field 5A.
W78-02886

AN EXAMPLE OF THE EXPERIMENTAL ANALYSIS OF RUNOFF FACTORS UNDER SIMULATED RAINFALLS, (IN FRENCH),
A. Lafforgue, and E. Nash.
Cah O R S T O M Ser Hydrol 13(3), p 195-237, 1976.

Descriptors: *Simulated rainfall, *Runoff, Africa, *Ivory Coast, *Upper Volta, Soil moisture, Vegetation, Cultivation.

In the framework of surface runoff measurements under simulated rainfalls in various countries of Ivory Coast and Upper-Volta, the 1st results obtained on a ferrallitic sandy soil of South Ivory Coast are presented. The apparatus and experimental methods used are described just as runoff characteristics resulting on experiment plots under simulated rainfalls. Connections between runoff characteristics and various factors such as shower intensity, initial soil moisture, slope, vegetation cover and tillage practices are drawn. For the type of soil studied, when it is not protected by vegetation, a pelting crust appears on its surface during the 1st rainfalls, impeding infiltration. Consequently, the vegetal cover is the most important factor. The paradoxical role of the slope is a moderator or runoff, the pelting crust decreasing when the slope increases. Significant correlation are found between initial soil moisture, rain intensity and runoff characteristics. Copyright 1978, Biological Abstracts, Inc.
W78-02898

MODEL FOR CALCULATING PRECIPITATION PENETRATING UNDER THE CANOPY OF MIXED STANDS, (IN RUSSIAN),
Akademiya Nauk SSSR, Zvenigorod (USSR). Lab. of Forestry.
L. P. Kharitonov.
Lesovedenie 1, p 74-83, 1977.

Descriptors: Forests, *Forest canopy, *Model studies, *Precipitation(Atmospheric), Birch, Moisture content, Pine, Spruce, *Trees(Water absorption).

A model for estimation of precipitation penetrating forest canopy is suggested. The calculation is given for pine, birch and spruce and includes ability of tree surface organs to absorb water, shape of a tree and its parts, and air moisture. Data estimated by the precipitation model and experimental ones are similar.--Copyright 1978, Biological Abstracts, Inc.
W78-03033

2C. Snow, Ice, and Frost

FREEZE-THAW ENHANCEMENT OF THE DRAINAGE AND CONSOLIDATION OF FINE-GRAINED DREDGED MATERIAL IN CONFINED DISPOSAL AREAS,
Cold Regions Research and Engineering, Hanover, NH.
For primary bibliographic entry see Field 4A.
W78-02777

PRECIPITATION SCAVENGING (1974).
Department of Energy, Oak Ridge, TN. Technical Information Center.
For primary bibliographic entry see Field 5A.
W78-02886

ARCTIC COASTAL PROCESSES: AN OVERVIEW,
Louisiana State Univ., Baton Rouge. Coastal Studies Inst.
W. J. Wiseman, Jr., and A. D. Short.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A027 794, Price codes: A02 in paper copy, A01 in microfiche. Technical Report No. 214, to Office of Naval Research, Reprinted from: Naval Research Reviews, Vol 29, No 5, p 35-47, May 1976. 5 fig, 25 ref. ONR-N00014-75-C-0192.

Descriptors: *Coasts, *Arctic, *Ice cover, *Seasonal, Geomorphology, Erosion, Deposition(Sediments), Sedimentation, Coastal processes, Nearshore processes.

Nearshore processes active along the Arctic coast are presented according to chronological format. During the winter months when both the land and sea are ice-covered, sedimentary and oceanographic processes are minimal. As breakup occurs, rapid changes are effected in the nearshore morphology. During open water, when the wind can act to force water motions, the same processes observed on temperate beaches and in temperate waters are active in the Arctic. Significant erosion and deposition may take place during these periods. As freezeup approaches and an ice-foot forms along the coast, nearshore sedimentary processes are inhibited. Finally, when freezeup is complete, the relatively inactive regime characteristic of winter is again achieved. (Sinha-OEIS)
W78-03093

2D. Evaporation and Transpiration

THE EVAPORATION FROM THETFORD FOREST DURING 1975,
Institute of Hydrology, Wallinford, (England).
J. H. C. Gash, and J. B. Stewart.
Journal of Hydrology, Vol 35, No 3/4, p 385-396, November 1977. 2 fig, 2 tab, 20 ref, 1 append.

Descriptors: *Evaporation, *Forests, *Model studies, Mathematical models, Trees, Pine trees, Vegetation, Vegetation effects, On-site investigations, Rainfall, Water loss, Temperature, Air temperature, Humidity, Meteorology, Forestry, Hydrology, *England, *Thetford Forest(Norfolk England).

Previous measurements of the surface resistance of pine forest were used in the Monteith version of the Penman equation to obtain an estimate of transpiration from automatic weather station data. This result, combined with measurements of the loss of water by evaporation of intercepted rainfall, was used to provide a quantitative estimate of the evaporation from Thetford Forest during 1975. (Sims-ISWS)
W78-02794

WATER BALANCE STUDIES IN THE EXPERIMENTAL BASINS OF THE UPPER HARZ MOUNTAINS,
Coblenz Federal Inst. of Hydrology (West Germany).
H-J. Liebscher.
Hydrological Sciences Bulletin, Vol. 22, No. 2, p 283-296, June 1977. 7 fig, 2 tab, 16 ref.

Descriptors: *Water balance, *Mountains, *Basins, Europe, Forest, Reforestation, Evaporation, Transpiration, Rain gages, Demonstration watersheds, Equations, *Upper Harz Mountains(Germany), *Lange Bramke Basin(Germany), *Winteral Basin(Germany), *Dicke Bramke Basin(Germany), *Steile Bramke Basin(Germany), Spruce trees, Potential evaporation.

Evaporation in the Upper Harz experimental basins was computed and compared to the values calculated according to formulas. Potential evaporation was determined for mean daily and monthly values by different methods. For the computation of the terms generally lacking in water balance studies, such as actual evaporation and changes in snow and soil storage, a model was established on the basis of daily values. As a result, water balances also could be drawn up for shorter periods, such as single years or months. One graph showed the annual variation of the actual evaporation as it resulted from the mean of 4 basins studied. Plotted for comparison was the potential evaporation according to Penman; using the Clausthal climatic data, the mean daily relative humidity was reduced by 1% and the daily sunshine duration increased by 1% as long as they remained below the possible values. (Roberts-ISWS)
W78-02800

ESTIMATE OF THE ACCURACY OF VARIOUS METHODS FOR COMPUTING TOTAL EVAPORATION IN THE MOUNTAINS OF KAZAKHSTAN AND SOVIET CENTRAL ASIA,
A. F. Litovchenko.
Soviet Hydrology, Selected Papers, Vol. 15, No. 1, p 50-53, 1976. 2 tab, 6 ref. Translated from Transactions of the Kazakh Hydrometeorological Scientific Research Institute (Trudy Kazakhskogo Nanchno-Issledovatel'skogo Gidrometeorologicheskogo Instituta), No. 48, p 156-162, 1975.

Descriptors: *Evaporation, *Mountains, *Model studies, Mathematical models, Equations, Formulas, Soil moisture, Elevation, Temperature, Air temperature, Humidity, Precipitation(Atmospheric), Analytical techniques, On-site investigations, On-site data collections, Evaporimeters, Meteorology, *USSR(Kazakstan and Central Asia).

There are many methods for computing evaporation from land. All have been developed for lowland conditions, and therefore, they do not allow for several factors typical of the mountains. This is the reason why the many attempts to apply them to the mountains failed to give the desired results. Only a few methods have been proposed for computing evaporation in the mountains and their error has not yet been sufficiently studied. The accuracy of several computation methods was estimated by comparing the results of the computations with observations taken with GGI-500 evaporimeters at several mountainous stations. Results of these comparisons were reported. (Sims-ISWS)
W78-02804

A PARAMETERIZATION OF GROUND-SURFACE MOISTURE CONTENT FOR USE IN ATMOSPHERIC PREDICTION MODELS,
National Center for Atmospheric Research, Boulder, CO.
For primary bibliographic entry see Field 2G.
W78-02808

EFFECT OF MINERAL NUTRITION ON TREE SEEDLING TRANSPIRATION UNDER NATURAL CONDITIONS, (IN BULGARIAN),
Bulgarian Academy of Sciences, Sofia. Inst. of Forestry.
Z. Stoyanov, and T. Dakev.
Fiziol Rast (Sofia) 2(3), p 77-82, 1976.

Descriptors: *Transpiration, Trees, *Plant transpiration, *Mineral nutrition, *Oak, *Fertilization, Fertilizers, Irrigation, *Nitrogen, *Phosphorus.

The effect of mineral nutrition on trees was studied in 5 yr old oak seedlings planted in the field under natural conditions. Ammonium nitrate (200 kg/ha) and ordinary super-phosphate (400 kg/ha) were applied on separate plots. Transpiration was measured psychometrically; relative air humidity was determined at the inlet and outlet of a plastic envelope placed on leaves and shoots attached to the plant. With data on air humidity and with the use of psychometric tables, the water content was calculated per liter of air at the inlet and at the outlet of the envelope. From this data the water transpired by the leaves per unit time was derived. The transpiration was then estimated per leaf fresh weight. N fertilizer application considerably reduced oak leaf transpiration, while P fertilizer application had either no effect on or slightly enhanced transpiration. With the aid of N fertilizer application the water expenditure per unit leaf weight can be considerably reduced and in this way irrigation water could be spared.-Copyright 1978, Biological Abstracts, Inc.
W78-03101

2E. Streamflow and Runoff

GEOMETRIC PARAMETERS THAT INFLUENCE FLOODPLAIN FLOW,
Army Engineer Waterways Experiment Station, Vicksburg, MS.
For primary bibliographic entry see Field 8B.
W78-02767

STREAMFLOW SIMULATION-A MODEL BASED ON CANNONICAL EXPANSIONS,
Indian Inst. of Tech., New Delhi. Dept. of Civil Engineering.
S. K. Spolia, and S. Chander.
Journal of Hydrology, Vol. 35, No. 3/4, p 279-298, November 1977. 2 fig, 3 tab, 7 ref.

Descriptors: *Streamflow, *Model studies, *Expansion, Hydrologic systems, Hydrology, Statistical methods, Streamflow forecasting, Monthly, Foreign countries, Foreign research, *India, Operational hydrology, Cannonical expansions, Autoregressive model.

A representation of a stochastic process in cannonical expansion form was introduced. A model based on these expansions was proposed for streamflow synthesis. It was shown that the proposed model not only reproduces the mean, the variance, and the first-order serial correlation coefficient, but also the entire correlation-cross-correlation matrix, which implies the reproduction of total persistence. Further, it was shown that the proposed model is more parsimonious in parameters than an equivalent autoregressive model and does not require the use of a three-stage iterative procedure, viz, identification, estimation, and validation, for its fitting to actual data. The model, with its parameters derived from a 49-year recorded sequence, was used to generate monthly streamflow sequences for some rivers of Punjab, India. (Lee-ISWS)
W78-02790

ASYMPTOTIC DISTRIBUTION OF MAXIMUM DEFICIT FOR LINEARLY DEPENDENT INFLOWS IN FULL FLOW REGULATION,
Engineering Consultants, Inc., Denver, CO.
K. N. Mutreja, and V. Yevjevich.
Journal of Hydrology, Vol 38, No 3/4, p 299-309, November 1977. 7 fig, 1 tab, 4 ref. NSF ENG74-17396.

Descriptors: *Reservoirs, *Water storage, *Model studies, *Mathematical models, Flow, Regulated flow, Inflow, Discharge(Water), Markov processes, Stochastic processes, Correlation analysis, Analytical techniques, Reservoir operation, Rivers, Statistics, Hydrology.

No close-form expression is available from the exact asymptotic expected value and variance of the maximum deficit of linearly dependent, either Markov or ARMA-model, net inflows into reservoirs. For a higher-order Markov model, parameters of asymptotic distributions of various statistics of partial sums for fixed sample size can be obtained either by equating this model to an equivalent first-order model, with its rho sub 1 equal to the sum of autoregression coefficients of the higher-order model, or parameters can be derived from those of the corresponding time-independent stochastic component (TISC). For ARMA models, these parameters may be derived from the TISC-variable and ARMA-model coefficients. This result is relevant for practical storage problems, enabling the determination of means and variances for various statistics of partial sums of higher-order Markov or ARMA models, with these means and variances then being used to compute probability distributions of these statistics. (Sims-ISWS)
W78-02791

RUN-SUMS OF ANNUAL FLOW SERIES,
Technical Univ. of Istanbul (Turkey). Dept. of Hydraulic and Water Power.
For primary bibliographic entry see Field 4A.
W78-02792

A PARAMETRIC APPROACH TO STATION WEIGHTS,
Indian Inst. of Tech., Kanpur. Dept. of Civil Engineering.
S. Ramaseshan, and R. S. Anant.
Journal of Hydrology, Vol 35, No 3/4, p 325-340, November 1977. 4 fig, 4 tab, 38 ref.

Descriptors: *Hydrologic systems, *Stations, *Weight, Model studies, Optimization, Hydrology, Rainfall-runoff relationships, Foreign research, Watersheds(Basins), Equations, Mathematical studies, Linear multiple input-single output systems, Nash model, Thiessen method.

A linear multiple input-single output system model with noninteracting Nash-type components was proposed for the hydrologic basin. Such a model permits the use of the observed station precipitation and streamflow data without averaging or areal interpolation. The station weights are among parameters of the system to be optimized. A gradient search technique was used to determine the optimum parameter values. Results from a number of storms for a basin indicated that Thiessen weights are satisfactory approximations to locally optimal values of the station weights. Their dependence, if any, on hydrometeorological and physiographic characteristics need further investigation. (Lee-ISWS)
W78-02793

TESTING THE EFFICIENCY OF ALGORITHMS AND STRATEGIES FOR AUTOMATIC CALIBRATION OF RAINFALL-RUNOFF MODELS,
Papua and New Guinea Univ., Port Moresby (New Guinea). Dept. of Geography.
For primary bibliographic entry see Field 2A.
W78-02798

ESTIMATION OF LOW RETURN PERIOD FLOODS,
Institute of Hydrology, Wallingford (England).
M. A. Beran, and M. J. Nozdryn-Plotnicki.
Hydrological Sciences Bulletin, Vol 22, No 2, p 275-282, June 1977. 3 fig, 4 tab, 4 ref, 2 append.

Descriptors: Europe, *Floods, *Estimating, Flood damage, Flood discharge, Flood frequency, Hydrology, Frequency, Foreign research, Return flow, Mathematical studies, Equations, *United Kingdom, *Low return period floods, Annual maximum return period, Langbein formula.

A method was sought for estimating low return period floods (0.2-5 years) from annual maximum data. The theoretical relationship between the peak over threshold and annual maximum return periods was re-examined, and an empirical relationship based upon United Kingdom flood data was proposed. (Lee-ISWS)
W78-02799

ACCURACY OF SYNTHETIC HYDROGRAPHS DERIVED FROM REPRESENTATIVE BASINS,
Canterbury Univ., Christchurch (New Zealand). Dept. of Civil Engineering.
G. Hoffmeister, and R. N. Weisman.
Hydrological Sciences Bulletin, Vol. 22, No. 2, p 297-312, June 1977. 6 fig, 5 tab, 20 ref.

Descriptors: *Watersheds(Basins), *Runoff, *Unit hydrographs, Hydrology, Peak discharge, Rainfall-runoff relationships, Equations, Mathematical studies, Forecasting, Precipitation(Atmospheric), Hydrographs, Modified Snyder method, Dimensionless hydrograph, Runoff distribution.

This study was undertaken to test methods by which a representative basin could be used to develop a synthetic unit hydrograph for an ungauged basin within its hydrological region. Three synthetic hydrograph methods were tested in two hydrological regions using three basins in each region. The methods tested were: (1) a modified Snyder method, (2) Commons' dimensionless hydrograph, and (3) Soil Conservation Service dimensionless hydrograph. The synthetic unit hydrographs were compared with unit hydrographs derived from actual storm data. The Snyder method proved reasonably accurate for the basins studied, producing synthetic hydrographs within the range of the individual storm hydrographs. The dimensionless graphs did not consistently overpredict or underpredict a hydrograph peak or give an accurate description of the unit hydrograph shape. (Lee-ISWS)
W78-02801

CORRELATION STRUCTURE AND TIME SCALE OF SIMPLE HYDROLOGIC SYSTEMS,
Swedish Meteorological and Hydrological Inst, Stockholm.
For primary bibliographic entry see Field 2A.
W78-02814

FLOODS IN OHIO--MAGNITUDE AND FREQUENCY,
Geological Survey, Columbus, OH. Water Resources Div.
E. E. Webber, and W. P. Bartlett, Jr.
Ohio Department of Natural Resources, Columbus, Division of Water Bulletin 45, May 1977. 74 p, 4 fig, 7 tab, 15 ref.

Descriptors: *Ohio, *Floods, *Flood frequency, *Flood peak, *Flood forecasting, Flood recurrence interval, Analytical techniques, Regression analysis, Equations, Gaging stations, Flow rates, Flow characteristics, Channel morphology, Drainage area, Small watersheds, Rainfall-runoff relationships, Hydrologic data, Maps.

Techniques are presented for estimating the magnitude and frequency of floods on Ohio streams. Regression analysis is used to develop equations which relate physical and climatic factors of river basins to peak discharge at stream gaging stations. The equations can be used to estimate flood magnitude with recurrence intervals from 2 to 100 years on drainage areas between 0.01 and 7,400 square miles. A summary of flood and watershed data for gaging stations with 10 or more years of record is included. Records for 215 gaging stations are used to develop the regression equations. Flood records of streams with significant regulation or urbanization are excluded from this analysis. (Woodard-USGS)
W78-03120

HYDRAULIC ANALYSIS, MAD RIVER AT STATE HIGHWAY 41, SPRINGFIELD, OHIO,
Geological Survey, Columbus, OH. Water Resources Div.
For primary bibliographic entry see Field 4C.
W78-03134

DRAINAGE AREAS OF THE GUYANDOTTE RIVER BASIN, WEST VIRGINIA,
Geological Survey, Charleston, WV. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-03135

APPLICATION OF REMOTELY SENSED LAND-USE INFORMATION TO IMPROVE ESTIMATES OF STREAMFLOW CHARACTERISTICS,
Geological Survey, Reston, VA. Water Resources Div.
For primary bibliographic entry see Field 4A.
W78-03136

ANALYSIS OF RUNOFF FROM SMALL DRAINAGE BASINS IN WYOMING,
Geological Survey, Cheyenne, WY. Water Resources Div.
G. S. Craig, Jr., and J. G. Rankl.
Open-file report 77-727, September 1977. 88 p, 31 fig, 15 tab, 24 ref.

Descriptors: *Rainfall-runoff relationships, *Small watersheds, *Model studies, *Design criteria, *Flood frequency, Flow characteristics, *Wyoming, Analytical techniques, Regression analysis, Synthetic hydrology, Hydrographs, Road design, *Culverts, Planning.

A flood-hydrograph study has defined the magnitude and frequency of flood volumes and flood peaks that can be expected from drainage basins smaller than 11 square miles in the plains and val-

ley areas of Wyoming. Rainfall and runoff data, collected for 9 years on a seasonal basis (April through September), were used to calibrate a rainfall-runoff model on each of 22 small basins. Long-term records of runoff volume and peak discharge were synthesized for these 22 basins. Flood volumes and flood peaks of specific recurrence intervals (2, 5, 10, 25, 50, and 100 years) were then related to basin characteristics with a high degree of correlation. Flood volumes were related to drainage area, maximum relief, and basin slope. Flood peaks were related to drainage area, maximum relief, basin slope, and channel slope. An investigation of ponding behind a highway embankment, with available storage capacity and with a culvert to allow outflow, has shown that the single fast-rising peak is most important in culvert design. Consequently, a dimensionless hydrograph defines the characteristic shape of flood hydrographs to be expected from small drainage basins in Wyoming. For design purposes, a peak and volume can be estimated from basin characteristics and used with the dimensionless hydrograph to produce a synthetic single-peak hydrograph. Incremental discharges of the hydrograph can be routed along a channel, where a highway fill and culvert are to be placed, to help determine the most economical size of culvert if embankment storage is to be considered. (Woodard-USGS)
W78-03137

2F. Groundwater

UNSTEADY FLOW TO A PUMPED WELL IN A FISSURED WATER-BEARING FORMATION,
Sheffield Univ. (England). Dept. of Civil and Structural Engineering.
N. S. Boulton, and T. D. Streltsova.
Journal of Hydrology, Vol. 35, No. 3/4, p 257-269, November 1977. 9 fig, 3 ref.

Descriptors: *Unsteady flow, *Groundwater movement, *Mathematical models, *Fissures(Geologic), *Water wells, Equations, Drawdown, Compressibility, Curves, Hydraulic properties, Porosity, Aquifer characteristics, Pumping, Discharge(Water), Flow, Permeability, *Type curves, Blocks.

New equations were derived for the drawdown in a water-bearing fissured rock formation, consisting of a set of horizontal low-permeability porous blocks separated by highly permeable fissures. Porous blocks and fissures were assumed to be compressible. The depth of the fissure is small compared with that of the block. The abstraction well, lined along the block, is pumped at a constant rate. The discharge per unit length of the unlined part in the fissure is constant, and the radius of the well is vanishingly small. Type curves for the drawdown in the fissure and the porous block were computed and plotted for some selected parameters involved. Procedure for determining the fissured aquifer parameter constants was outlined. (Visocky-ISWS)
W78-02787

UNSTEADY FLOW TO A PUMPED WELL IN A TWO-LAYERED WATER-BEARING FORMATION,
Sheffield Univ. (England). Dept. of Civil and Structural Engineering.
N. S. Boulton, and T. D. Streltsova.
Journal of Hydrology, Vol. 35, No. 3/4, p 245-256, November 1977. 5 fig, 1 ref.

Descriptors: *Unsteady flow, *Groundwater movement, *Mathematical models, *Water wells, Equations, Drawdown, Fissures(Geologic), Compressibility, Hydraulic properties, Aquifer characteristics, Pumping, Curves, Discharge(Water), Permeability, *Layered aquifers, *Type curves, Vertical flow, Horizontal flow, Blocks.

New equations were derived for the drawdown in an aquifer, consisting of two horizontal layers, referred to as the block and the fissure, which have different hydraulic properties. The block and the fissure are compressible. Account was taken of both the horizontal and vertical flow components in the block and the fissure. The depth of the fissure was assumed to be small compared with that of the block. The abstraction well, which is pumped at a constant rate, has a vanishingly small radius. Type curves for drawdowns in the fissure and the block were computed and plotted for some values of the aquifer constants involved. (Visocky-ISWS)
W78-02788

ANALYTICAL SOLUTION FOR A TWO-FLUID FLOW IN A COASTAL AQUIFER INVOLVING A PHREATIC SURFACE WITH PRECIPITATION,
Rijkswaterstaat, Rijswijk (Netherlands). Data Processing Div.
For primary bibliographic entry see Field 2L.
W78-02789

CORRELATION STRUCTURE AND TIME SCALE OF SIMPLE HYDROLOGIC SYSTEMS,
Swedish Meteorological and Hydrological Inst., Stockholm.
For primary bibliographic entry see Field 2A.
W78-02814

GEOLOGY AND GROUND WATER IN WESTERN SANTA CRUZ COUNTY, CALIFORNIA, WITH PARTICULAR EMPHASIS ON THE SANTA MARGARITA SANDSTONE,
Geological Survey, Menlo Park, CA. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-03129

GROUND-WATER HYDROLOGY OF THE LOWER MILLIKEN-SARCO-TULUCAY CREEKS AREA, NAPA COUNTY, CALIFORNIA,
Geological Survey, Menlo Park, CA. Water Resources Div.
M. J. Johnson.
Water-Resources Investigations 77-82, August 1977. 40 p, 15 fig, 4 tab, 30 ref.

Descriptors: *Groundwater resources, *Aquifer characteristics, *Hydrogeology, *Withdrawal, *Water demand, Water utilization, California, Water level fluctuations, Groundwater recharge, Surface-groundwater relationships, Evapotranspiration, Storage capacity, Specific yield, Groundwater availability, Water supply, Napa County(Calif), Milliken Creek, Sarco Creek, Tulucay Creek.

The Sonoma Volcanics are the principal water-bearing materials in the lower Milliken-Sarco-Tulucay Creeks area, which occupies about 15 square miles in and east of Napa, Calif. The distribution and composition of these volcanic units are highly variable and complex. Annual pumpage of 3,000 acre-feet, mostly from the Sonoma tuffs, represents a significant portion of the groundwater discharge. The seasonal change in groundwater storage was about 6,600 acre-feet in 1975. Water-level data from the area reflect the seasonal change in ground-water storage, with fluctuations of 3 to 60 feet. The storage capacity to a depth of 500 feet may be as much as 196,000 acre-feet in the study area, but physical and economic factors may restrict the usable capacity to about 20,000 acre-feet. Recharge is generally inadequate to marginal under 1975 demand. There is insufficient recharge in the Milliken and Sarco Creeks area to support 1975 pumpage. Long-term changes in the seasonal peak water levels indicate an average decline of 1.5 feet per year. By 1975 annual pumpage was not exceeding recharge in the Tulucay Creek area. Although a downward trend in water levels was noted in the western part of this basin in the late 1940's, the pumping distribution and its stress on the ground-water system have since changed, and no overall downward trend was evident in the Tulucay Creek area in 1975. (Woodard-USGS)
W78-03133

2G. Water In Soils

FLOW THROUGH SOIL WITH INITIAL GRADIENT,
Punjab Agricultural Univ., Ludhiana (India).
P. Basak.
Indian Journal of Meteorology, Hydrology and Geophysics, Vol 28, No 1, p 103-106, January 1977. 4 fig, 1 tab, 18 ref.

Descriptors: *Soil water movement, *Hydraulic gradient, *Model studies, *Laboratory tests, Mathematical models, Equations, Soils, Clay loam, Soil water, Saturation, Saturated soils, Saturated flow, Groundwater movement, Hydraulic conductivity, Drainage, Irrigation, Capillary conductivity, Capillary water, Hydrology.

A short review of the phenomenon of initial gradient in irrigation, drainage, and consolidation problems was made, and an analysis was presented to show that for the problem of horizontal and vertical capillary saturation, nonrecognition of initial gradient would lead to serious error in the estimation of ultimate travel length and the time rate on progress of saturation lines. (Sims-ISWS)
W78-02796

A PARAMETERIZATION OF GROUND-SURFACE MOISTURE CONTENT FOR USE IN ATMOSPHERIC PREDICTION MODELS,
National Center for Atmospheric Research, Boulder, CO.
J. W. Deardorff.
Journal of Applied Meteorology, Vol. 16, No. 11, p 1182-1185, November 1977. 1 fig, 8 ref.

Descriptors: *Soil moisture, *Moisture content, Irrigation, *Model studies, Mathematical models, Precipitation(Atmospheric), *Evaporation, Evapotranspiration, Diurnal, Soils, Solar radiation, Drying, Vegetation, Vegetation effects, Atmosphere, Atmospheric physics, Meteorology, *Soil-surface moisture.

A rate equation for soil-surface moisture fraction was developed which makes use of the more customary bulk soil moisture content, as well as the soil-surface evaporation rate minus precipitation rate. Two empirical constants involved were estimated from soil measurements. The evaporation rate relative to potential evaporation was taken as the ratio of soil-surface moisture fraction to its saturated threshold value. It was shown how the parameterization simulates the drying of the soil surface on a diurnal and longer time scale following irrigation or precipitation and eliminates large errors of up to a factor of 5 which can be incurred by atmospheric prediction models that treat only the bulk soil moisture in the absence of foliage. (Sims-ISWS)
W78-02808

OBSERVATIONS ON LONG-TERM FERTILITY OF CULTIVATED SOILS AT GRIMARI (CENTRAL AFRICAN REPUBLIC): RESULTS OF SEMI-INTENSIVE MECHANIZED CULTIVATION TESTS ON MODERATELY DESATURATED RED FERRALITIC SOILS IN THE SUDANO-GUINEAN CLIMATE OF CENTRAL AFRICA,
R. Morel, and P. Quantin.
Agron Trop Ser Agron Gen Etud Sci. 27(6/7), p 667-729, 1972.

Descriptors: *Africa, *Climates, *Cultivated soils, *Cultivation, Desaturated red soils, *Fertility, Soils, Tests.

At Grimari, 3 trials with mechanical cultivation were made on moderately desaturated and red colored ferralitic soils, derived from gneiss under a soudano-guinean climate in Central Africa: the 1st trial, with cultivation on large areas, was intended to test a semi intensive rotation (4 yr in cultivation, 4 yr in fallow) on large plots (0.5 ha) with alternating belts of cultivation and fallow according to the Australian antierosion system; with the second, called 'of erosion,' the erosion was studied on 10 small plots with different variates: grade of declivity, antierosion treatment, rotation of crops and fertilization: the 3rd, called 'of rotation,' compared the effect on the yield of many rotations with long, mean or short time of fallow or continuous cultivation. In these trials, the evolution of the physical and chemical characteristics of soils with the time was compared with the yields of crops, which were used to determine soil fertility. The traditional rotation with a long fallow period must no longer be considered as a necessity for the maintenence of soil fertility. With mechanical cultivation and suitable techniques (rotation, pesticide and fertilizer application, weed control) have allowed yield increases within fairly economical limits. The productivity of soil per unit area was increased by about 2.5 times. This allows reduction of the area of cultivated ground and choice of the best lands for agriculture without damage to soil conservation.--Copyright 1974, Biological Abstracts, Inc.
W78-02867

AN EXAMPLE OF THE EXPERIMENTAL ANALYSIS OF RUNOFF FACTORS UNDER SIMULATED RAINFALLS, (IN FRENCH),
For primary bibliographic entry see Field 2B.
W78-02898

STUDY OF THE SIMULTANEOUS MOVEMENT OF WATER AND AIR IN SOILS, (IN RUSSIAN),
Vsesoyuznyi Nauchno-Issledovatelskii Inst. Gidrotekhniki i Melioratsii, Moscow (USSR).
V. V. Vedernikov, and V. F. Nikitenkov.
Pochvovedenie 12, p 73-78, 1976.

Descriptors: *Soil water movement, Capillary water, Moisture content, *Soil moisture, Capillarity, *Infiltration, Mathematical analysis.

The effect of air in the soil on both the infiltration and capillary rising of moisture was subjected to mathematical analysis. The described mathematical approach to processes of moisture movement in incompletely saturated soils offers possibilities for predicting not only the water regime but also the gas and other regimes of soils. Copyright 1978, Biological Abstracts, Inc.
W78-02998

THE APPLICATION OF POLYMERS TO INCREASE SOIL PERMEABILITY, (IN RUSSIAN),
Moscow State Univ. (USSR). Dept. of Soil Melioration; and Moscow State Univ. (USSR). Dept. of Physics.
A. I. Mosolova, and V. F. Utkaeva.
Vestn Mosk Univ Ser Vi Biol Pochvoved 31(6), p 109-115, 1976.

Descriptors: *Soil permeability, Polymers, Porosity, Soil conditioners, Soil treatments, Soil moisture, Acrylamides, Alcohol compounds.

The effect of some soil-conditioning polymers on water-stability, porosity and permeability of soils was studied. Such soil-conditioning polymers as K-4, K-9, Gupan, PVA (polyvinyl alcohol) PAA (polyacrylamide) applied in doses of 001% to the weight of soils were favorable for improvement of water-stability of soils.--Copyright 1978, Biological Abstracts, Inc.
W78-03055

CHANGES IN THE MICROSCOPIC STRUCTURE OF SODPODZOLIC SOILS CAUSED BY THE ARTIFICIAL GROUNDWATER FLOODING AND SUBMERGING, (IN RUSSIAN),
Moscow State Univ. (USSR). Dept. of Soil Geography.
K. N. Fedorov, and Ya. M. Gadzhiev.
Vestn Mosk Univ Ser Vi Biol Pochvoved 31(6), p 121-126, 1976.

Descriptors: *Sod-podzolic soils, Groundwater, *Soil microstructure, Soil compaction, Carbonates, Clays, Organic matter.

Prolonged flooding and submergence of sod-podzolic soils results in changes of compactness, anisotrophy of clay substances, changes in proportion of micromorphological forms of organic matter and the dissolution of carbonates.--Copyright 1978, Biological Abstracts, Inc.
W78-03060

DETERMINATION OF SOIL MOISTURE IN STUDYING ROOT COMPETITION ON MOUNTAIN SLOPES, (IN RUSSIAN),
I. I. Khanbekov, and N. G. Ivanov.
Lesovedenie 1, p 84-87, 1977.

Descriptors: *Soil moisture, Mountain slopes, Roots, *Plant growth, Growth rates.

Investigations of the amount of soil moisture along slopes with plots isolated by means of trenches, and comparison of humidity dynamics in isolated and unisolated plots showed that registration of local moisture is necessary to study the effect of mature stand roots on regrowth in mountains.--Copyright 1978, Biological Abstracts, Inc.
W78-03061

EVALUATION OF ARID ZONE SOILS FOR THE PURPOSE OF IRRIGATION, (IN RUSSIAN),
G. G. Reshetov, and V. R. Shredder.
Pochvovedenie 3, p 103-107, 1977.

Descriptors: *Arid lands, Evaluation, Soils, *Irrigation, Indicators, Classification, *Soil classification, Cultivation.

A qualitative evaluation of lands according to classes and groups of fertility is presented. Evaluation according to classes is based on the quality of soil forming materials; the other soil indicators are, to a large degree, levelled by irrigation and serve as a basis for subdivision of classes into groups. The presented evaluation scale corresponds to 3 periods of cultivation.--Copyright 1978, Biological Abstracts, Inc.
W78-03150

IRRIGATION EROSION OF LANDS AND ITS CONTROL, (IN RUSSIAN),
For primary bibliographic entry see Field 2J.
W78-03151

INFLUENCE OF THE CONSTITUTION OF CALCAREOUS SOILS FROM SOUTH-EASTERN FRANCE ON THEIR STRUCTURAL PROPERTIES AND MOISTURE CHARACTERISTICS, (IN FRENCH),
Nice Univ. (France). Lab. of Botany.
J. Chiaverini, and R. Gras.
Bull Assoc Fr Etude Sol 4, p 227-239, 1976.

Descriptors: *Calcareous soils, *Soil moisture, *France, Porosity, *Capillary action, Adsorption, *Calcium carbonate, *Limestone, Particle size.

The effect of limestone on structural properties and moisture characteristics of soils is studied statistically. The sample concerns calcareous soils collected in SE France. It presents an important and continuous scale of variation of CaCO. Particle size composition accounts for a great portion of the water retention. Sand negative effects at high moisture levels and clay positive effects at low moisture levels express the relative weight of the 2 main mechanisms of water retention, capillary effects in pores and adsorption of colloids. CaCO percentages supply a contribution distinct from particle-size distribution. The most efficient parameter is the ratio (CT/CA) between the whole carbonate (CT) and the active carbonate (CA) which acts negatively at a 5% significance level. The calcareous fraction plays a significant part in moisture characteristics, particle size composition explains a small part of the aggregates stability index. Aggregate stability when CT increases but CA has no effect.--Copyright 1978, Biological Abstracts, Inc.
W78-03152

PHYSICAL PROPERTIES OF SILT CRUSTS, (IN GERMAN),
W. Ehlers.
Z Pflanzenernaehr Bodenkd 140(1), p 79-90, 1977.

Descriptors: *Soil physical properties, *Silts, Soil erosion, Porosity, Organic carbon, Hydraulic conductivity, Loess, Organic matter, Porosity, Rainfall, *West Germany.

The physical properties of silt crusts of 2 locations within the eastern part of the Soiing mountains in Western Germany were investigated. They were found downhill on top of sloping grey brown podzolic soils derived from loess during heavy rainfall, which caused aggregate breakdown and erosion. The crusts were several cm in thickness. They consisted of 80% coarse silt (20-60 micrometers), 12% medium silt (6-20 micrometers) and 5% clay (<2 micrometers). The content of organic matter was low. Porosity of the silt crusts was 47-51 vol%. Compressed silt crusts with 40% porosity contained only 2.5 vol% of large pores >15 micrometers. The unsaturated hydraulic conductivity remained almost constant when tensions were increasing, but it dropped immediately when the 15 micrometers pores drained at 200 cm H20 pressure. The saturated conductivity varied with porosity in the range of 10-50 cm/day. In the Ap horizon of a grey brown podzolic soil with higher contents in clay and organic C the saturated conductivity varied with porosity in the range of 10-10,000 cm/day. Only during rainstorms with high intensity did silt crusts impede rapid water infiltration into the underlying grey brown podzolic soil.--Copyright 1978, Biological Abstracts, Inc.
W78-03153

EFFECT OF ROOT SYSTEMS AND SOIL DENSITY ON ANTIEROSION STABILITY, (IN RUSSIAN),
Moscow State Univ. (USSR). Dept. of Physics; and Moscow State Univ. (USSR). Dept. of Melioration.
For primary bibliographic entry see Field 4D.
W78-03157

2H. Lakes

RESPONSES OF ALGAE AND BACTERIA TO NUTRIENT ADDITIONS IN BOTTLED LAKE WATER,
Tokyo Metropolitan Univ., Tokyo (Japan). Dept. of Biology.
For primary bibliographic entry see Field 5C.
W78-02708

PRELIMINARY EVALUATION OF WATER QUALITY OF PROPOSED FOUNTAIN LAKE, COLORADO.
Army Engineers Waterways Experiment Station, Vicksburg, MS.
For primary bibliographic entry see Field 5A.
W78-02755

SUMMARY REPORT, ARCADIA LAKE WATER-QUALITY REPORT STUDY,
Army Engineer Waterways Experiment Station, Vicksburg, MS.
For primary bibliographic entry see Field 5A.
W78-02756

DESIGN WAVE INFORMATION FOR THE GREAT LAKES; REPORT 4, LAKE HURON,
Army Engineer Waterways Experiment Station, Vicksburg, MS.
For primary bibliographic entry see Field 8B.
W78-02769

MARYSVILLE LAKE HYDROTHERMAL STUDY; REPORT 1, 900-MW PROJECT; HYDRAULIC AND MATHEMATICAL MODEL INVESTIGATION,
Army Engineer Waterways Experiment Station, Vicksburg, MS.
For primary bibliographic entry see Field 8B.
W78-02773

FREEZE-THAW ENHANCEMENT OF THE DRAINAGE AND CONSOLIDATION OF FINE-GRAINED DREDGED MATERIAL IN CONFINED DISPOSAL AREAS,
Cold Regions Research and Engineering, Hanover, NH.
For primary bibliographic entry see Field 4A.
W78-02777

WATER-QUALITY EVALUATION OF A LOWER POOL ELEVATION FOR PROPOSED ARCADIA LAKE, OKLAHOMA,
Army Engineer Waterways Experiment Station, Vicksburg, MS.
For primary bibliographic entry see Field 5A.
W78-02780

FORECAST OF THE CHANGE IN THE HYDROLOGIC BUDGET, LEVEL, AND MINERAL CONTENT OF LAKE BALKHASH IN THE NEXT TEN YEARS,
R. D. Kudrin, and S. A. Rubinovich.
Soviet Hydrology, Selected Papers, Vol. 15, No. 1, p 54-64, 1976. 9 fig, 5 tab, 21 ref. Translated from Transactions of the Kazakh Hydrometeorological Scientific Research Institute (Trudy KazNIGMI), No. 52, 1975, p 64-86.

Descriptors: *Hydrologic budget, *Forecasting, *Lakes, *Salt balance, *Asia, Water levels, Water quality, Salts, Water balance, Hydrology, Data collections, Lake stages, Water level fluctuations, Runoff, Surface waters, Evaporation, Precipitation(Atmospheric), Foreign research, Foreign countries, *USSR, *Lake Balkhash(USSR).

The amplitude of multisecular water level fluctuations in Lake Balkhash reaches 10-14 m. Three successive intrasecular cycles with a period of 50-60 years and amplitude of 2.5-4.0 m have been identified from observational (1911-1972), historical, and geomorphological data. The amplitude of these fluctuations is comparable with the variations in lake levels that can be produced by industrial activity. The two factors, climate and industry, must be taken into account in forecasting future variations in the hydrologic budget and level of the lake for long-period planning. The filling of the Kapchagay Reservoir in 1970 produced a sharp change in the natural regime of the Ili River and Lake Balkhash. Prior to 1970, the fluctuations of the hydrologic budget and levels of the lake were determined by climatic fluctuations (precipitation and air temperature) as well as by the change in the magnitude of runoff losses in the Ili River delta. The average mineral content of the hydrochemical regions of the lake was computed, and results of the computations were tabulated. The increase in the average mineral content of the eastern Balkhash (by a factor of 1.7) will exceed somewhat that of the western Balkhash (an increase by a factor of 1.5). The presented results of the forecast of the hydrologic budget, level, and mineral content of Lake Balkhash are preliminary and will be refined in the future as the method of determining the components of the water and salt budgets, of estimating the effect or irrigation on runoff, and the forecasts of climatic fluctuations are refined. (Humphreys-ISWS)
W78-02805

LAKE-LAND PRECIPITATION RELATIONSHIPS USING NORTHERN LAKE MICHIGAN DATA,
National Oceanic and Atmospheric Administration, Ann Arbor, MI. Great Lakes Environmental Research Lab.
For primary bibliographic entry see Field 2B.
W78-02807

FEEDING AND GROWTH OF PLANT-EATING FISH IN PONDS OF THE CHITA STATE REGIONAL ELECTRIC POWER PLANT,
For primary bibliographic entry see Field 5C.
W78-02837

DATA ON THE HYDROBIOLOGY OF THE FISH PONDS OF THE 'URAI' FISHERY, (IN RUSSIAN),
Akademiya Nauk Uzbekskoi SSR, Tashkent. Inst. Zoologii i Parazitologii.
E. A. Tashpulatov.
Uzb Biol Zh. 17(4), p 48-49, 1973.

Descriptors: Aristichthys-Nobilis, Benthos, Cladocera, Copepoda, Ctenopharyngodon-Idella, *Cyprinus-Carpio, *Fish ponds, Fishery, *Hydrobiology, Hypophthalmichthys-Molitrix, Plankton, Seasons, Urai, USSR, Uzbek-SSR, Zooplankton, *Carp.

A hydrobiological characterization of the fish ponds of the 'Urai' fishery in the vicinity of Kokand in Uzbek SSR, USSR in which the pond carp (Cyprinus carpio), grass carp (Ctenopharyngodon idella), silver carp (Hypophthalmichthys molitrix) and speckled carp (Aristichthys nobilis) are raised is presented and observations on the formation of zooplankton and benthos in them are given. Copepods and Cladocera predominated in the zooplankton during all seasons.--Copyright 1974, Biological Abstracts, Inc.
W78-02858

ICHTHYOFAUNA OF THE MALA HANA STREAM IN RELATION TO THE WATER RESERVOIR AT OPATOVICE,
Ceskoslovenska Akademie Ved, Brno. Inst. of Vertebrate Zoology.
S. Lusk.
Zool Listy. 22(3), p 253-263, 1973.

Descriptors: Cottus-Poecilopus, Czechoslovakia, Fauna, Feeding, *Ichthyo fauna, *Mala-Hana, *Opatovice Reservoir(Czech), Plankton, Rainbow trout, Reproduction, Reservoirs, Stocking, Streams.

Species composition, abundance and biomass of the fish population was investigated in the Mala Hana Stream with respect to the storage type water reservoir constructed at Opatovice, Czechoslovakia (45 ha in water surface area). Altogether 6 spp. of fishes were ascertained in the stream, with Salmo trutta m. fario and Cottus poecilopus predominating. The orignial fish population of the stream is very suitable both for the maintenance of the trout character of the reservoir and with respect to the water management purpose of the reservoir, as it does not contain plankton feeders capable of overpopulation. The fish population of the reservoir should consist of brown and rainbow trout to prevent the occurrence of other fish species and thus indirectly act as one of positive factors affecting the quality of the water stored in the reservoir. The initial brown and rainbow trout population will be stocked at 300 individuals/species. It is intended to regulate the fish population by angling according to a specific fishing regulation. Natural reproduction of both trout species is not expected to occur and the fish population will be mantained by stocking.--Copyright 1974, Biological Abstracts, Inc.
W78-02859

FACTORS CONTROLLING PHYTOPLANKTON PRODUCTION AND SUCCESSION IN A HIGHLY EUTROPHIC LAKE (KINNEGO BAY, LOUGH NEAGH). I. THE PHYTOPLANKTON COMMUNITY AND ITS ENVIRONMENT,
New Univ. of Ulster, Coleraine (Northern Ireland). School of Biological and Environmental Studies.
For primary bibliographic entry see Field 5C.
W78-02987

FACTORS CONTROLLING PHYTOPLANKTON PRODUCTION, AND SUCCESSION IN A HIGHLY EUTROPHIC LAKE (KINNEGO BAY, LOUGH NEAGH) II. PHYTOPLANKTON PRODUCTION AND ITS CHIEF DETERMINANTS,
New Univ. of Ulster, Coleraine (Northern Ireland). School of Biological and Environmental Studies.
For primary bibliographic entry see Field 5C.
W78-02988

FACTORS CONTROLLING PHYTOPLANKTON PRODUCTION AND SUCCESSION IN A HIGHLY EUTROPHIC LAKE (KINNEGO BAY, LOUGH NEAGH) III. INTERSPECIFIC COMPETITION IN RELATION TO IRRADIANCE AND TEMPERATURE,
New Univ. of Ulster, Coleraine (Northern Ireland). School of Biological and Environmental Studies.
For primary bibliographic entry see Field 5C.
W78-02989

LIMNOLOGICAL COMPARISON OF CULTURALLY EUTROPHIC SHAGAWA LAKE AND ADJACENT OLIGOTROPHIC BURNTSIDE LAKE, MINNESOTA,
Pacific Northwest Environmental Research Laboratory, Corvallis, OR.
For primary bibliographic entry see Field 5C.
W78-02991

DISTRIBUTION OF ARSENIC, CADMIUM, LEAD, ZINC, COPPER, MANGANESE, AND IRON CONTAINED IN THE BOTTOM SEDIMENT OF LAKE BIWA,
Kyoto Univ., Otsu (Japan). Otsu Hydrobiological Station.
For primary bibliographic entry see Field 5B.
W78-02999

DYNAMICS OF WATER-SOLUBLE ORGANIC MATTER AND BIOGENIC ELEMENTS IN BOTTOM SEDIMENTS OF THE TSYBUL'NIK BAY IN THE KREMENCHUG RESERVOIR, (IN RUSSIAN),
Akademiya Nauk URSR, Kiev. Inst. Hidrobiologii.
For primary bibliographic entry see Field 5B.
W78-03001

EFFECT OF SULFATE ON CARBON AND ELECTRON FLOW DURING MICROBIAL METHANOGENESIS IN FRESHWATER SEDIMENTS,
Wisconsin Univ.-Madison. Dept. of Bacteriology.
For primary bibliographic entry see Field 5C.
W78-03003

SALMONELLA IN SURFACE WATERS OF CENTRAL NEW YORK STATE,
New York State Coll. of Agriculture and Life Sciences, Ithaca.
For primary bibliographic entry see Field 5C.
W78-03004

EFFECTS OF DESTRATIFICATION AND AERATION OF A LAKE ON THE DISTRIBUTION OF PLANKTONIC CRUSTACEA, YELLOW PERCH, AND TROUT,
Wisconsin Dept. of Natural Resources, Madison.
For primary bibliographic entry see Field 5C.
W78-03006

CHROMATOGRAPHIC INVESTIGATION OF INOSITOL PHOSPHATE ESTERS IN LAKE WATERS.
Wisconsin Univ.-Madison. Water Chemistry Lab., Water Chemistry Laboratory, University of Wisconsin, Madison.
For primary bibliographic entry see Field 5A.
W78-03007

PHOSPHORUS MODELS FOR EUTROPHIC LAKES,
Michigan Univ., Ann Arbor.
For primary bibliographic entry see Field 5C.
W78-03008

THE MINERAL NUTRIENTS LEVELS IN THREE NORFOLK BROADS DIFFERING IN TROPHIC STATUS, AND AN ANNUAL MINERAL CONTENT BUDGET FOR ONE OF THEM,
University of East Anglia, Norwich (England). Schools of Biological; and University of East Anglia, Norwich (England). Environmental Sciences.
For primary bibliographic entry see Field 5C.
W78-03011

CORRESPONDENCE OF AMMONIA CONTENT AND ACETYLENE REDUCTION ACTIVITY IN SLUDGE SAMPLES OF LAKE HARKORT (RUHR VALLEY), (IN GERMAN),
Staatliches Amt Wasser-und Abfallwirtsch. Hagen (West Germany).
For primary bibliographic entry see Field 5C.
W78-03012

DISTRIBUTION, ABUNDANCE, AND RESOURCE UTILIZATION OF LITTORAL ZONE FISHES IN RESPONSE TO A NUTRIENT/PRODUCTION GRADIENT IN LAKE MEMPHREMAGOG,
McGill Univ., Montreal (Quebec). Dept. of Biology.
For primary bibliographic entry see Field 5C.
W78-03013

SOMATIC AND GENERATIVE PRODUCTION AND SIZE OF PLANKTONIC CRUSTACEANS,
Belorussian State Univ., Minsk (USSR).
For primary bibliographic entry see Field 5C.
W78-03015

STRUCTURE OF SEASONAL ZOOPLANKTON COMPLEXES OF VOLGO GRAD RESERVOIR,
Gosudarstvennyi Nauchno-Issledovatelskii Inst. Ozernogo i Rechnogo Rybnogo Khozyaistva, Saratov (USSR).
For primary bibliographic entry see Field 5C.
W78-03016

A NOTE ON SOME DISTINCTIVE LIMNOLOGICAL FEATURES OF GOVINDSAGAR RESERVOIR, HIMACHAL PRADESH,
Central Inland Fisheries Research Inst., Barrackpore (India); and All-India Coordinated Research Project on Ecology and Fisheries of Fresh Water Reservoirs, Hazribagh (India).
For primary bibliographic entry see Field 5C.
W78-03017

PLANKTONIC DIATOMS AND SOME DIATOM-SILICA RELATIONS IN A SHALLOW EUTROPHIC SCOTTISH LOCH,
Institute of Terrestrial Ecology, Edinburgh (Scotland). Wetlands Research Group.
For primary bibliographic entry see Field 5C.
W78-03020

MACROPHYTE SUCCESSION IN SWEDISH LAKES CAUSED BY DEPOSITION OF AIRBORNE ACID SUBSTANCES,
Swedish Water and Air Pollution Research Lab., Gothenburg.
For primary bibliographic entry see Field 5C.
W78-03022

EXPERIMENTAL LAKES AREA AND CANADIAN LIMNOLOGY, (IN GERMAN),
Max-Planck-Inst. fuer Limnologie zu Ploen (West Germany).
For primary bibliographic entry see Field 5C.
W78-03026

CARBON BUDGETS IN LAKE ONTARIO,
Canada Centre for Inland Waters, Burlington (Ontario).
For primary bibliographic entry see Field 5C.
W78-03027

THERMALLY STRATIFIED ACID WATER IN LATE WINTER - A KEY FACTOR INDUCTING SELF-ACCELERATING PROCESSES WHICH INCREASE ACIDIFICATION,
Swedish Water and Air Pollution Research Lab., Gothenburg.
For primary bibliographic entry see Field 5C.
W78-03028

L OLIVIER LAGOON, (IN FRENCH),
Centre Univ. de Luminy, Marseille (France). Lab. du Histol. Morphogen. Anim.
For primary bibliographic entry see Field 5C.
W78-03039

GREAT LAKES WATER QUALITY, FIFTH ANNUAL REPORT TO THE INTERNATIONAL JOINT COMMISSION.
International Joint Commission-United States and Canada. Great Lakes Water Quality Board.
For primary bibliographic entry see Field 5G.
W78-03041

PARTICULAR CHARACTER OF THE EUTROPHICATION MECHANISM IN THE ETANG DE BERRE, (IN FRENCH),
Centre d'Oceanographie, Marseille (France). Station Marine d'Endoume.
For primary bibliographic entry see Field 5C.
W78-03065

PRIMARY PRODUCTION, ORGANIC MATTER DESTRUCTION AND BACTERIAL NUMBERS IN THE SARATOV RESERVOIR, (IN RUSSIAN),
Akademiya Nauk SSSR, Moscow. Inst. Biologii Vnutrennykh Vod.
For primary bibliographic entry see Field 5C.
W78-03066

BENTHIC FAUNA SPECIES DIVERSITY IN SIX CENTRAL FLORIDA LAKES IN SUMMER,
Florida Technological Univ., Orlando.
For primary bibliographic entry see Field 5C.
W78-03072

EFFECT OF WIND AND RAIN ON SURFACE REAERATION,
Asian Inst. of Tech., Bangkok (Thailand).
R. B. Banks, and F. Flores.
Journal of the Environmental Engineering Division, Proceedings of ASCE Vol. 103, No. 3, p. 489-504, June 1977. 9 fig, 3 tab, 20 ref, append.

Descriptors: *Rainfall, *Wind velocity, *Lakes, *Lagoons, Biochemical oxygen demand, Dissolved oxygen, Mathematical studies, Air-water interfaces, Reaeration, Surface reaeration coefficient.

Results of a study of the surface reaeration coefficient are presented. An examination is made of the effect of wind action and rainfall on the value of the coefficient in lakes and lagoons. It is concluded that the effects of wind action and rainfall cause an increase in the magnitude of the oxygen transfer coefficient in lakes and lagoons. The study concludes that the transfer coefficient due to the combined effects of wind and rain is less than the sum of the transfer coefficients due to the two effects considered separately. The basic assumption is that the transfer coefficient due to rainfall is directly proportional to the power of the rainfall. It is suggested that additional experiments be conducted with artificial and natural rainfalls, to confirm or modify the assumption. It is also noted that the amount of oxygen added directly to a lake by raindrops can be significant if the drops are oxygen saturated. And it is suggested study results may have additional application in the problem of erosion or soil due to rainfall. (Coyle-Wisconsin)
W78-03073

WATER RESOURCES RESEARCH PROGRAM. TRANSPORT AND DISPERSION OF OIL-REFINERY WASTES IN THE COASTAL WATERS OF SOUTHWESTERN LAKE MICHIGAN (EXPERIMENTAL DESIGN--SINKING-PLUME CONDITION),
Argonne National Lab., IL. Energy and Environmental Systems Div.
For primary bibliographic entry see Field 5B.
W78-03092

ENVIRONMENTAL BASELINE FOR MAUMEE BAY,
National Oceanic and Atmospheric Administration, Ann Arbor, MI. Great Lakes Environmental Research Lab.
For primary bibliographic entry see Field 5A.
W78-03095

QUANTITATIVE DYNAMICS OF ZOOPLANKTON AND ZOOBENTHOS IN REARING PONDS IN THE UKRAINIAN SSR WITH DIFFERENT FISH DENSITIES, (IN RUSSIAN),
Ukrainian Research Inst. of the Fish Industry, Kiev (USSR).
S. A. Krazhan, N. N. Kharitonova, K. I. Benko, S. A. Isaeva, and N. M. Mikulina.
Gidrobiol Zh Zh 13(1), p 40-47, 1977.

Descriptors: *Zooplankton, *Benthos, *Fish production, Zoobenthos, Ponds, *Carp, Chironomids, Crustaceaus, Forests, Larvae, Rotatoria, *USSR(Ukranian SSR).

An increase in density of fish location in the principal carp ponds of the Ukraine (USSR) with respect to zones, causes a rise in the quantitative development of zooplankton from the steppe to the forest-steppe and polessie (6.1-11.1-15.6 g/m to the third power) and zoobenthos from polessie to the forest-steppe 1.6-3.2 g/m to the second power). In the steppe ponds with the maximal density of fish (6.0-12.0 thousand individuals +/ha) these values were 1.3 and 0.4 g/m to the second power and with the minimal density (3.4-6.0 thousand individuals/ha), 10.9 g/m to the second power. A considerable part of the zooplankton at all values

of density belongs to the Rotatoria (42.6-65.8%), and of biomass to Crustacea (52.3-74.6%). Zoobenthos consisted mainly of the chironomid larvae (54.8-98.7% of the number, 65.5-99.1% of the biomass).--Copyright 1978, Biological Abstracts, Inc.
W78-03096

THE RELATIONSHIP OF BACTERIOPLANKTON WITH PHYTO- AND ZOOPLANKTON IN FISH-REARING PONDS, (IN RUSSIAN),
Ukrainian Research Inst. of the Fish Industry, Kiev (USSR).
For primary bibliographic entry see Field 5C.
W78-03097

DYNAMICS AND PRODUCTION OF POPULATIONS OF MASS SPECIES OF POND PLANKTON CLADOCERANS, (IN RUSSIAN),
Belorusski Nauchno-Issledovatelskii Inst. Rybnogo Khoziaistva, Minsk (USSR).
L. V. Kamlyuk, and V. P. Lyakhnovich.
Gidrobiol Zh 13(1), p 48-55, 1977.

Descriptors: *Crustaceans, Biomass, Carp, *Productivity, Ponds, *Bosmina-longirostris, *Ceriodaphnia-quadrangula, *Daphnia-longispina, Fish predation, Seasonal, Somatic production.

The productivity of Bosmina longirostris, Ceriodaphnia quadrangula and Daphnia longispina was studied depending on seasonal dynamics of population biomass under conditions of different intensity of elimination by 2 yr carp. A close correlation of fertility with the character of biomass dynamics is shown for populations of Bosmina and Ceriodaphnia. For water fleas the dependence is complicated by pressure of selective consumption of large individuals by carp. The analogous dependence is found for specific productivity of species populations. Ratios of generative and somatic production were determined. The regularities considered are in good agreement with the degree of fish predation pressure on the Cladocera populations.--Copyright 1978, Biological Abstracts, Inc.
W78-03155

2I. Water In Plants

WOODS OF THE PUNIOS SILAS RESERVATION (THE LITHUANIAN SSR): 1. GEOBOTANICAL REVIEW, (IN RUSSIAN),
Akademiya Nauk Litovskoi SSR, Vilnius. Inst. of Botany.
Yu. Yu. Strazdaite, Zh. P. Lazdauskaite, and R. L. Yankyavichene.
Liet Tsr Moksiu Akad Darbai Ser C. 2, p 29-50, 1973.

Descriptors: Alder, Birch, Carpinus-betulus, Fir, *Geobotanical review, Grasses, Hylocomium-proliferum, Hylocomium-spp, Lichens, *Lithuanian-SSR, Oxalis-acetosella, Pine, Punios, Quercus-robur, Reservation, Silas, Soil, Sorrel, Terrain, Tilia-cordata, USSR, *Woods, Forests.

The Punia Pine forest reservation (about 2700 ha) stretches over the loop of the river Nemunas near the village of Punia (South Lithuania (USSR)). According to the physical and geographical division of Lithuania into districts, the reservation territory enters the physical and geographical district of the plateau of the middle reaches of the river Nemunas and the lower reaches of the river Neris. Pine Forests with Hylocomium and lichen pine forests were found to be predominant in the reservation. A considerable fir admixture had been observed in the pine forests with Hylocomium. In the herb layers Oxalis acetosella was predominant, while the moss cover H. proliferum prevailed. In the reservation, big fir-grove areas were found side by side with the pine forests. Floral composition of the fir-groves investigated was found to be close to the broad-leaved fir-grove type. They abound with oaks (Quercus robur), hornbeams (Carpinus betulus) and Tilia cordata. Nemorose grass cover was observed in the herb layer. The fir-grove communities were found to abound with wood sorrel. Rather small areas are occupied by oak-groves (Querceta), hornbeam-groves (Carpineta), black aldertree-groves (Alneta glutinosae) and birch-groves (Betuleta pendula). They interve in the predominant trees of the pine forest. Small patches of flood plains stretch over the littor al of the river Nemunas and sometimes mesoxerophytic meadows in the forest. The location of the communities investigated depends on relief and mechanical composition of soil. The amount of nutrient substances in the surface soil layers is not the determinant factor in the community formation.--Copyright 1974, Biological Abstracts, Inc.
W78-02732

HYDROLOGIC AND METEOROLOGICAL ROLE OF FOREST PLANTATIONS OF VARIOUS TREE SPECIES,
Vsesoyuznyi Nauchno-Issledovatelskii Inst. Lesovodstva i Mekhanizatsii Lesnogo Khozyaistva, Pushkino (USSR).
For primary bibliographic entry see Field 4C.
W78-02806

A CONTRIBUTION TO THE MORPHOLOGY AND ECOLOGY OF SHEMAIA CHALCALBURNUS CHALCOIDES (GULD) FROM THE BERDA RIVER, (IN RUSSIAN),
Melitopolskii Pedagogicheskii Inst. (USSR).
A. S. Loshakov.
Vopr Ikhtiol. 13(4), p 603-610, 1973.

Descriptors: *Berda River(USSR), *Chalcalburnus-Chalcoides, Dams, *Ecology, *Morphology, Productivity, Rivers, Shemaia.

Comparative data on plastic and meristic indices of shemaia of the Southern Bug, the Sulinsk branch of the Dunaya and the Berda River since 1949 are presented. Shemaia of the Dunaya type had higher plastic and meristic indices than shemaia from the Dnepr-Azov (the highest and lowest body height, length of tail, number of scales on the lateral line, etc.). Shemaia spawn at different times (from Jan.-Apr.) in different years, depending on the hydrological conditions, at a water temperature of 4-7 degrees. Before erecting dams in the Berda River, egg-laying began in the last 10 days of May at a water temperature of 16-22 degrees. After damming of the river, spawning below the dam began in the last 10 days of May and 1st 10 days of June. A decline in the productivity of shemaia of the Berda River begins several days after casting out the final portions of the sexual products and continues until the end of July. In order to preserve the natural spawning grounds of the Berda River and safeguard the productivity of shemaia and other valuable fish, the following measures are suggested: establish a 3-km forbidden zone below the dam; prohibit fishing from March-July below the forbidden zone and remove silt from the river, from the forbidden zone to the dam.--Copyright 1974, Biological Abstracts, Inc.
W78-02860

OBSERVATION ON THE EFFECT OF FEEDING LABEO ROHITA (HAM) WITH CHLORELLA VULGARIS BEIJERINCK AND SCENEDESMUS OBLIQUUS (TURPIN) KUETZING,
Christ Church Coll., Kanpur (India).
A. B. Gupta, and D. C. Roy.
Labdev J Sci Technol Part B Life Sci. 10(3/4), p 142-147, 1972.

Descriptors: *Chlorella-vulgaris, Feeding, *Labeo-rohita, *Scenedesmus-obliquus, Weight, Fingerlings.

Feeding experiments with Chlorella vulgaris and Scenedesmus obliquus were carried out on the fingerlings of Labeo rohita. The observations show an increase in weight and volume and an overall improvement in the general condition of the fingerlings fed with these algae.--Copyright 1974, Biological Abstracts, Inc.
W78-02868

MODEL FOR CALCULATING PRECIPITATION PENETRATING UNDER THE CANOPY OF MIXED STANDS, (IN RUSSIAN),
Akademiya Nauk SSSR, Zvenigorod (USSR). Lab. of Forestry.
For primary bibliographic entry see Field 2B.
W78-03033

INFLUENCE OF DROUGHT ON THE MORPHOLOGY OF THE ROOT SYSTEM OF CAREX SETIFOLIA, (IN FRENCH),
Centre National de la Recherche Scientifique, Gif-sur-Yvette (France). Lab. du Phytotron.
S. Da, C. Hubac, and H. Vartanian.
Can J Bot 55(9), p 1236-1245, 1977.

Descriptors: Droughts, *Drought resistance, *Plant growth, *Growth rates, Cortex, *Root systems, *Carex setifolia.

Two kinds of roots, differing in width, were grown from the regularly watered rhizome of C. setifolia in strict cultural conditions. When plants are subjected to drought, which increases water deficit in the plants, root growth stops and the root tip necroses while lateral root initiation is stimulated. After rewatering, growth of aerial parts is resumed, either from the oldest tiller after greatest diameter show an increase in thickness just behind the tip. The thickening lasts 48 h after the beginning of watering, then roots grow normally again. Sometimes, several roots initiate from the thickened portion of the tuberized zone. A histological study of the normal roots and tuberized zones indicates that the difference occurs in the cortex. The cortex is lacunar in normal roots, but it looks dense in tuberized parts of the roots and consists of radial rows of cells apparently generated from an extra-endodermic layer. This generative zone is normally present, though undeveloped and nonfunctional in normal roots of C. setifolia. A large amount of starch is found in the cortex of the thickened parts of the roots.--Copyright 1978, Biological Abstracts, Inc.
W78-03035

STUDIES ON MUD-FLOW IN THE DAISEN WATER SYSTEM, (IN JAPANESE),
Tottori Univ. (Japan). Lab. of Erosion Control.
T. Sugimoto, K. Tanaka, and S. Ikeda.
Bull Tottori Univ For 8, p 41-62, 1975.

Descriptors: *Roots, Trees, Distribution, Muds, Plant growth, Growth rates, Tree scars, *Dendrological methods.

Dendrological methods, including study of reaction wood, stem analysis, adventitious root age and distribution of tree scars, were used to determine mud deposition and movement.--Copyright 1978, Biological Abstracts, Inc.
W78-03056

DETERMINATION OF SOIL MOISTURE IN STUDYING ROOT COMPETITION ON MOUNTAIN SLOPES, (IN RUSSIAN),
For primary bibliographic entry see Field 2G.
W78-03061

EFFECT OF MINERAL NUTRITION ON TREE SEEDLING TRANSPIRATION UNDER NATURAL CONDITIONS, (IN BULGARIAN),
Bulgarian Academy of Sciences, Sofia. Inst. of Forestry.
For primary bibliographic entry see Field 2D.
W78-03101

EFFECT OF MINERAL NUTRITION AND WATER SUPPLY ON POPLAR TREE PHOTOSYNTHESIS AND GROWTH, (IN BULGARIAN),
Research Station of Rapid-Growth Tree Species, Svistov (Bulgaria).
K. Dimitrov, and M. Dimitrova.
Fiziol Rast (Sofia) 2(3), p 43-51, 1976.

Descriptors: *Photosynthesis, *Mineral nutrition, Trees(Photosynthesis), *Poplars, Plant growth, Fertilizers, Fertilization, Soils, Irrigation, *Nitrogen, *Phosphorus, Populus bachelieri, *Potassium.

Photosynthesis and growth were studied in 5 yr old poplar plantations of Populus I-214 and P. bachelieri clones in dry locations. The soil was carbonate-chernozem containing in its upper 60 cm the more important elements: N, 37 mg/1000 g (after Tyurin-Kononova); P, 1.3 mg/1000 g (after Olsen); and K, 46 mg/1000 g (after Milcheva). Mineral fertilizer application at a N, P and K rate was performed 3 times, while irrigation with 240 mm of water was effected in the 4th year and with 600 mm in the 6th year. A positive correlation was established between soil nutrient substances and poplar leaves. The differences were insignificant and existed only during the 1st half of the vegetation period. Under conditions without irrigation poplar trees needed largest quantities of nutrient elements at the beginning of vegetation, May and June. With irrigation the need for nutrient elements was high also during the 2nd half of the vegetation period. At the locations situated far away from rivers, irrigation only, during the 4th and 5th yr the biomass was doubled. The effect of mineral fertilizer application was lower in dry years. The combined application of mineral fertilizers in spring and irrigation during the entire vegetation period resulted in a 3-fold increase of the productivity of poplar plantations grown at dry locations. Copyright 1978, Biological Abstracts, Inc.
W78-03138

BENTHOS BIOMASS IN SOME WATERCOURSES OF THE CHUKOTSKI PENINSULA, (IN RUSSIAN),
Akademiya Nauk SSSR, Vladivostok. Inst. of Biology and Soil Science.
V. Ya. Levanidov.
Gidrobiol Zh 13(1), p 56-62, 1977.

Descriptors: *Benthos, *Biomass, *Daphnia, Bosmina-longirostris, Ceriodaphnia-quadrangula, Daphnia-longispina, Daphnia-pulex, Density, *USSR(Chukotski pennisula).

Benthos biomass (Bosmina longirostris, Daphnia longispina, D. pulex, Ceriodaphnia quadrangula) in the Chukotsk small streams running in the mountain tundra amounts to 3.2 plus or minus 2.2 g/m2 (95% level of reliability). Population density depends on the season and character of the stream and varies from 667-3368 specimens/m2. An inverse relationship is observed between benthos biomass and contact of land waters with ever-frozen layers. The obtained values are compared with those determined for submontane rivers of lower latitudes.--Copyright 1978, Biological Abstracts, Inc.
W78-03156

2J. Erosion and Sedimentation

GUIDELINES FOR MONITORING AND REPORTING DEMONSTRATION PROJECTS; SECTION 32 PROGRAM, STREAMBANK EROSION CONTROL EVALUATION AND DEMONSTRATION ACT OF 1974,
Army Engineer Waterways Experiment Station, Vicksburg, MS.
For primary bibliographic entry see Field 4D.
W78-02754

IMPERIAL BEACH, CALIFORNIA, DESIGN OF STRUCTURES FOR BEACH EROSION CONTROL; HYDRAULIC MODEL INVESTIGATION,
Army Engineer Waterways Experiment Station, Vicksburg, MS.
For primary bibliographic entry see Field 8B.
W78-02768

MATHEMATICAL MODEL OF ESTUARIAL SEDIMENT TRANSPORT,
California Univ., Davis. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2L.
W78-02774

LITERATURE SURVEY AND PRELIMINARY EVALUATION OF STREAMBANK PROTECTION METHODS,
Army Engineer Waterways Experiment Station, Vicksburg, MS.
M. P. Keown, N. R. Oswalt, E. B. Perry, and E. A. Dardeau.
Available from the National Technical Information Service, Springfield, VA 22161 as ADA-042 052, Price codes: A12 in paper copy, A01 in microfiche. Technical Report H-77-9, May 1977. 262 p, 68 fig, 5 tab, 1635 ref, 5 append.

Descriptors: *Bank erosion, *Bank protection, *Bibliographies, Evaluation, *Erosion control, Evaluation.

A preliminary study of streambank erosion control was conducted with the major emphasis on an extensive literature survey of known streambank protection methods. In conjunction with the survey, preliminary investigations were conducted to identify the mechanisms that contribute to streambank erosion and to evaluate the effectiveness of the most widely used streambank protection methods. The results of the literature survey and the two preliminary investigations are presented herein. The text of the 'Streambank Erosion Control Evaluation and Demonstration Act of 1974' is presented in Appendix A. A list of commercial concerns that market streambank protection products is provided in Appendix B. Appendix C contains a glossary of streambank protection terminology. A detailed bibliography resulting from the literature survey is provided in Appendix D, and a listing of selected bibliographies related to streambank protection are provided in Appendix E. (WES)
W78-02776

INCREASING SHORELINE EROSION RATES WITH DECREASING TIDAL RANGE IN THE VIRGINIA CHESAPEAKE BAY,
Virginia Inst. of Marine Science, Gloucester Point.
For primary bibliographic entry see Field 2L.
W78-02811

CHARACTERISTICS OF DREDGED BOTTOM SEDIMENTS,
Northwestern Univ., Evanston, IL. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5B.
W78-02813

UNDERWATER SAMPLER,
Benthos, Inc., N. Falmouth, MA. (Assignee).
S. O. Raymond.
U.S. Patent No. 4,019,380, 14 p, 9 fig, 3 ref; Official Gazette of the United States Patent Office, Vol 957, No 4, p 1367, April 26, 1977.

Descriptors: *Patents, *Sampling, *Bottom sampling, Sediments, Bottom sediments, Mechanical properties, Equipment, Free-fall samplers.

Ocean of lake floor samplers or the recoverable free-fall type are usually dropped in the area where a specimen is to be taken and allowed to free-fall to the bottom of the body of water where the sampler obtains a specimen of the bottom and then floats to the water's surface where it can be retrieved with the specimen intact. These samplers have particular utility for obtaining specimens of an oceanic bottom to determine the presence of manganese nodules in preparation of oceanic mining. This invention provides an underwater sampler in which the ballast releasing mechanism and the jaw members operate independently of one another. It has a jaw biasing means which is not as susceptible to damage or interference from objects passing between the jaw members when the latter are in an open position. Accidnetal actuating of the triggering mechanism and premature closing of the jaw members and release of the ballast is prevented. The invention also provides means for resistance to soft muck to prevent the sampler from sinking too deeply. (Sinha-OEIS)
W78-02903

DISTRIBUTION OF ARSENIC, CADMIUM, LEAD, ZINC, COPPER, MANGANESE, AND IRON CONTAINED IN THE BOTTOM SEDIMENT OF LAKE BIWA,
Kyoto Univ., Otsu (Japan). Otsu Hydrobiological Station.
For primary bibliographic entry see Field 5B.
W78-02999

EFFECT OF SULFATE ON CARBON AND ELECTRON FLOW DURING MICROBIAL METHANOGENESIS IN FRESHWATER SEDIMENTS,
Wisconsin Univ.-Madison. Dept. of Bacteriology.
For primary bibliographic entry see Field 5C.
W78-03003

ESTIMATION OF NATURAL POLLUTION LOADS FROM STREAMFLOW MEASUREMENTS IN REMOTE CATCHMENTS,
Northern Forest Research Center, Edmonton (Alberta).
For primary bibliographic entry see Field 5B.
W78-03005

INVESTIGATIONS OF ENERGY FLOW IN SEDIMENTS OF KIEL BAY (BALTIC SEA), (IN GERMAN),
Akademiya Nauk URSR, Kiev. Inst. Zoologii.
For primary bibliographic entry see Field 2L.
W78-03029

CHNSED: SIMULATION OF SEDIMENT AND TRACE CONTAMINATION TRANSPORT WITH SEDIMENT/CONTAMINANT INTERACTION,
Oak Ridge National Lab., TN.
For primary bibliographic entry see Field 5B.
W78-03057

PROCESSES OF SEDIMENT TRANSPORT AND TIDAL DELTA DEVELOPMENT IN A STRATIFIED TIDAL INLET,
Louisiana State Univ., Baton Rouge. Coastal Studies Inst.
For primary bibliographic entry see Field 2L.
W78-03089

NEARSHORE PROCESSES ON A FRINGING REEF,
Louisiana State Univ., Baton Rouge. Coastal Studies Inst.
For primary bibliographic entry see Field 2L.
W78-03090

SEDIMENT TRANSPORT AND DEPOSITION IN A MACROTIDAL RIVER CHANNEL: ORD RIVER, WESTERN AUSTRALIA,
Louisiana State Univ., Baton Rouge. Coastal Studies Inst.

For primary bibliographic entry see Field 2L.
W78-03091

ARCTIC COASTAL PROCESSES: AN OVERVIEW,
Louisiana State Univ., Baton Rouge. Coastal Studies Inst.
For primary bibliographic entry see Field 2C.
W78-03093

ENVIRONMENTAL BASELINE FOR MAUMEE BAY,
National Oceanic and Atmospheric Administration, Ann Arbor, MI. Great Lakes Environmental Research Lab.
For primary bibliographic entry see Field 5A.
W78-03095

IRRIGATION EROSION OF LANDS AND ITS CONTROL, (IN RUSSIAN),
Yu. P. Polyakov.
Pochvovedenie 3, p 91-97, 1977.

Descriptors: Crops, *Irrigation practices, *Soil erosion, *USSR(North Caucasus).

Practices controlling irrigational erosion with the use of different methods of soil irrigation on the North Caucasus (USSR) are described. Quantitative parameters of (crop) irrigation under different conditions are presented.--Copyright 1978, Biological Abstracts, Inc.
W78-03151

EFFECT OF ROOT SYSTEMS AND SOIL DENSITY ON ANTIEROSION STABILITY, (IN RUSSIAN),
Moscow State Univ. (USSR). Dept. of Physics; and Moscow State Univ. (USSR). Dept. of Melioration.
For primary bibliographic entry see Field 4D.
W78-03157

2K. Chemical Processes

A TITRATION APPARATUS FOR THE DETERMINATION OF DISSOLVED OXYGEN IN SEAWATER,
Bedford Inst. of Oceanography, Dartmouth (Nova Scotia). Atlantic Oceanographic Lab.
For primary bibliographic entry see Field 5A.
W78-02815

AVAILABILITY AND CHEMICAL CHARACTERISTICS OF GROUND WATER IN CENTRAL LA PLATA COUNTY, COLORADO,
Geological Survey, Lakewood, CO. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-03118

AVAILABILITY AND CHEMICAL QUALITY OF GROUND WATER IN THE CRYSTAL RIVER AND CATTLE CREEK DRAINAGE BASINS NEAR GLENWOOD SPRINGS, WEST-CENTRAL COLORADO,
Geological Survey, Lakewood, CO. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-03119

WATER QUALITY OF TAMPA BAY, FLORIDA: WET-WEATHER CONDITIONS, OCTOBER 1971,
Geological Survey, Tampa, FL. Water Resources Div.; and Geological Survey, Lawrence, KS. Water Resources Div.
For primary bibliographic entry see Field 5A.
W78-03128

GEOLOGY AND GROUND WATER IN WESTERN SANTA CRUZ COUNTY, CALIFORNIA, WITH PARTICULAR EMPHASIS ON THE SANTA MARGARITA SANDSTONE,
Geological Survey, Menlo Park, CA. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-03129

2L. Estuaries

ON THE BENTHIC COMMUNITY OF YOKKAICHI HARBOR,
Mie Prefectural Univ., Tsu (Japan). Faculty of Fisheries.
For primary bibliographic entry see Field 5C.
W78-02709

POLLUTION OF THE BALTIC BY CRUDE OIL PRODUCTS (ZANLECZYSZCZENIE BALTYKU SUBSTANCJAMI ROPOPOCHODNYMI),
For primary bibliographic entry see Field 5A.
W78-02716

MASS STRANDING OF THE LONG-FINNED PILOT WHALE, GLOBICEPHALA MELAENA, ON SABLE ISLAND, NOVA SCOTIA,
Ontario Veterinary Coll., Guelph.
For primary bibliographic entry see Field 5C.
W78-02735

COASTAL WATER RESEARCH PROJECT, ANNUAL REPORT 1975,
Southern California Coastal Water Research Project, El Segundo, CA.
W. Bascom.
Coastal Water Research Project, Annual Report for the Year Ended 30 June 1975. 212 p, 69 fig, 50 tab, 120 ref, 4 append.

Descriptors: *Publications, *Coasts, *Path of pollutants, *Water pollution sources, *California, Research and development, Biology, Fish, Invertebrates, Distribution, Speciation, Laboratory tests, Sampling, Water pollution effects, Chemistry, Toxicity, Ecology, DDT, Domestic wastes, Industrial wastes, Seawater, Southern California, Los Angeles, Toxicants.

A broad overall study of the southern California coastal waters ecology was reviewed. Areas of study included a biology program (microbiology, fish diseases, toxicity, invertebrate ecology, fish ecology), a chemistry program (chlorinated hydrocarbons, trace metals), an engineering program, management and facilities, and appendices. Pollutants in municipal wastewaters were found to have decreased slowly from 1971-1975, with the exception of DDT which dropped dramatically. Water pollution sources including municipal wastes, air and harbors were discussed in addition to the water motions which influence the movement of pollutants. 500 species of fish and 4,000 species of invertebrates were determined to inhabit the coastal waters. Methodologies in data analysis, sampling, laboratory tests, and evaluation determinations were discussed. (Klein)
W78-02740

ECOLOGICAL AND DISEASE STUDIES OF DEMERSAL FISHES IN PUGET SOUND NEAR METRO-OPERATED SEWAGE TREATMENT PLANTS AND IN THE DUWAMISH RIVER,
Washington Univ., Seattle. Fisheries Research Inst.
For primary bibliographic entry see Field 5A.
W78-02741

A COMPUTER-AIDED AERIAL PHOTOGRAPHIC ANALYSIS OF FIRE ISLAND INLET GEOMORPHOLOGY,
Army Engineer Waterways Experiment Station, Vicksburg, MS.
For primary bibliographic entry see Field 4A.
W78-02761

A CONSULTANT'S REVIEW OF THE LOS ANGELES-LONG BEACH HARBORS STUDY,
Army Engineer Waterways Experiment Station, Vicksburg, MS.
R. O. Reid, R. G. Dean, and L. E. Borgman.
Available from the National Technical Information Service, Springfield, VA 22161 as ADA-043 734, Price codes: A02 in paper copy, A01 in microfiche. Miscellaneous Paper M-77-10, August 1977. 23 p, 1 append.

Descriptors: *Harbors, California, Waves(Water), Hydraulics, *Los Angeles Harbor(Calif), *Long Beach Harbor(Calif).

A consultant's review of the Los Angeles-Long Beach Harbors Study was performed by Professor Robert O. Reid of Texas A&M University, Professor Robert G. Dean of the University of Delaware, and Professor Leon E. Borgman of the University of Wyoming. The review primarily covers the acquisition and analyses of prototype wave and ship motion data. Comments and suggestions are offered regarding improvements and methods of attack for the present and future studies of this type. (WES)
W78-02763

A NUMERICAL HINDCAST MODEL FOR WAVE SPECTRA ON WATER BODIES WITH IRREGULAR SHORELINE GEOMETRY; REPORT 1, TEST OF NONDIMENSIONAL GROWTH RATES,
Army Engineer Waterways Experiment Station, Vicksburg, MS.
For primary bibliographic entry see Field 8B.
W78-02764

DETAILED DESIGN FOR DYKE MARSH DEMONSTRATION AREA, POTOMAC RIVER, VIRGINIA,
Army Engineer Waterways Experiment Station, Vicksburg, MS.
For primary bibliographic entry see Field 8B.
W78-02765

IMPERIAL BEACH, CALIFORNIA, DESIGN OF STRUCTURES FOR BEACH EROSION CONTROL; HYDRAULIC MODEL INVESTIGATION,
Army Engineer Waterways Experiment Station, Vicksburg, MS.
For primary bibliographic entry see Field 8B.
W78-02768

TSUNAMI-WAVE ELEVATION FREQUENCY OF OCCURRENCE FOR THE HAWAIIAN ISLANDS,
Army Engineer Waterways Experiment Station, Vicksburg, MS.
For primary bibliographic entry see Field 8B.
W78-02770

MATHEMATICAL MODEL OF ESTUARIAL SEDIMENT TRANSPORT,
California Univ., Davis. Dept. of Civil Engineering.
R. Ariathurai, R. C. MacArthur, and R. B. Krone.
Available from the National Technical Information Service, Springfield, VA 22161 as ADA-047 202, Price codes: A08 in paper copy, A01 in microfiche. Army Engineer Waterways Experiment Station, Vicksburg, Mississippi, Technical Report D-77-12, October 1977. 158 p, 39 fig, 11 tab, 6 append, 31 ref.

Descriptors: *Deposition(Sediments), *Erosion, *Estuaries, *Finite element analysis, *Mathematical models, *Sediment transport, *Sedimentation, *Suspended load.

A two-dimensional finite element model that simulates erosion, transport, and deposition of suspended sediments is presented. The breadth-averaged or depth-averaged equations may be used depending on the problem to be solved. The governing equations for two phase transport are derived and then solved by the finite element method using isoparametric quadrilateral elements in which a quadratic approximation is made for the suspended sediment concentrations. Expressions used for the rates and conditions under which erosion and deposition occur are from previous experimental studies. Continuing aggregation is accounted for by specifying the settling velocity of the flocks in each element at each time step. The bed is considered to be formed of a number of layers of sediment whose physical properties change with overburden pressure. The model provides suspended sediment concentrations and bed profile at each time step. (WES)
W78-02774

AQUATIC DISPOSAL FIELD INVESTIGATIONS, EATONS NECK DISPOSAL SITE, LONG ISLAND SOUND; APPENDIX A: INVESTIGATIONS OF THE HYDRAULIC REGIME AND THE PHYSICAL CHARACTERISTICS OF BOTTOM SEDIMENTATION,
Yale Univ., New Haven, CT. Dept.of Geology and Geophysics.
For primary bibliographic entry see Field 5E.
W78-02782

AQUATIC DISPOSAL FIELD INVESTIGATIONS, EATONS NECK DISPOSAL SITE, LONG ISLAND SOUND; APPENDIX D: PREDISPOSAL BASELINE CONDITIONS OF DEMERSAL FISH ASSEMBLAGES,
New York Ocean Science Lab., Montauk.
For primary bibliographic entry see Field 5E.
W78-02783

AQUATIC DISPOSAL FIELD INVESTIGATIONS, EATONS NECK DISPOSAL SITE, LONG ISLAND SOUND; APPENDIX E: PREDISPOSAL BASELINE CONDITIONS OF ZOOPLANKTON ASSEMBLAGES,
New York Ocean Science Lab., Montauk.
For primary bibliographic entry see Field 5E.
W78-02784

AQUATIC DISPOSAL FIELD INVESTIGATIONS, EATONS NECK DISPOSAL SITE, LONG ISLAND SOUND; APPENDIX F: PREDISPOSAL BASELINE CONDITIONS OF PHYTOPLANKTON ASSEMBLAGES,
New York Ocean Science Lab., Montauk.
For primary bibliographic entry see Field 5E.
W78-02785

ANALYTICAL SOLUTION FOR A TWO-FLUID FLOW IN A COASTAL AQUIFER INVOLVING A PHREATIC SURFACE WITH PRECIPITATION,
Rijkswaterstaat, Rijswijk (Netherlands). Data Processing Div.
P. Van der Veer.
Journal of Hydrology, Vol. 35, No. 3/4, p 271-278, November 1977. 3 fig, 15 ref.

Descriptors: *Saline water intrusion, *Saline water-freshwater interfaces, *Groundwater, *Model studies, Coasts, Interfaces, Water levels, Aquifers, Groundwater movement, Salinity, Rainfall, Precipitation(Atmospheric), Flow, Mathematical models, Analytical techniques, Saline water, Freshwater, Surfaces, Hydrology, Two-fluid flow.

The problem of determining the steady position of an interface and a phreatic surface in a coastal aquifer was investigated. Fresh groundwater flows towards the sea. Simultaneously, there is a salt water flow which may be directed seawards or landwards. The upper boundary of the flow region involves a phreatic surface with precipitation. The analytical solution of the problem was given in the form of two expressions of complex parameters. Expressions for the position of the interface and the phreatic surface were given. It appears that salt water flow may have a great influence on the steady positions of the phreatic surface and interface. (Sims-ISWS)
W78-02789

THE VARIABILITY OF ANTICYCLONIC CURRENT PATTERNS IN THE GULF OF MEXICO,
National Oceanic and Atmospheric Administration, Miami, FL. Atlantic Oceanographic and Meteorological Labs.
D. W. Behringer, R. L. Molinari, and J. F. Festa.
Journal of Geophysical Research, Vol. 82, No. 34, p 5469-5476, November 20, 1977. 15 fig, 1 tab, 19 ref.

Descriptors: *Water circulation, *Gulf of Mexico, *Water temperature, On-site data collections, Data processing, Ocean circulation, Eddies, Seasonal, Variability, Circulation, Oceanography, *Loop Current(Gulf of Mexico), *Gulf of Mexico currents, Eddy separations, Gyres.

A recent twofold increase in the number of temperature observations available in the Gulf of Mexico has prompted a reappraisal of several ideas regarding the temporal variability of the Loop Current in the eastern gulf and the anticyclonic gyre in the western gulf. The analysis included both synoptic data drawn from 47 cruises in the eastern gulf and monthly maps of temperature at 200 m prepared from observations over the entire gulf. It was found that on average the penetration of the Loop Current into the gulf increases during the winter and spring, reaching a maximum in the early summer, at which time a large anticyclonic eddy probably separates from the loop. It also was found that there are substantial deviations from this average sequence of events; during the past dozen years the period between eddy separations has been as short as 8 months and as long as 17 months. The data coverage of the western gulf was sparse, but there was evidence for the year-round persistence of the anticyclonic gyre and some indications that the gyre may be strongest in summer and winter. (Sims-ISWS)
W78-02810

INCREASING SHORELINE EROSION RATES WITH DECREASING TIDAL RANGE IN THE VIRGINIA CHESAPEAKE BAY,
Virginia Inst. of Marine Science, Gloucester Point.
P. S. Rosen.
Chesapeake Science, Vol. 18, No. 4, p 383-386, December 1977. 3 fig, 3 tab, 7 ref.

Descriptors: *Beach erosion, *Virginia, *Chesapeake Bay, *Erosion rates, Tides, Tidal waters, Surveys, Erosion, Geomorphology, Estuaries, Bays, Water levels, Data collections, On-site investigations.

The Virginia Chesapeake Bay has a large variation (200%) in tidal range (0.36 m to 1 m) over a relatively short (120 km) distance. Analysis of a regional sampling of shoreline morphology and processes demonstrated that decreasing tidal ranges result in increasing long-term erosion rates. This results because larger water levels increased by storm surges have a lower probability of reaching the elevation of the fastland (bluff or dune) material to augment erosion. Secondly, the wave energy is distributed over a greater distance in the course of a tidal cycle. (Humphreys-ISWS)
W78-02811

A TITRATION APPARATUS FOR THE DETERMINATION OF DISSOLVED OXYGEN IN SEA-WATER,
Bedford Inst. of Oceanography, Dartmouth (Nova Scotia). Atlantic Oceanographic Lab.
For primary bibliographic entry see Field 5A.
W78-02815

ESTUARINE SANCTUARY GUIDELINES.
National Oceanic and Atmospheric Administration, Washington, DC.
Federal Register, Vol 42, No 175, p 45522-23, September 9, 1977.

Descriptors: *Estuarine environment, Grants, *Ecosystems, *Conservation, *Governmental interrelations, Research and development, Government finance, Cost repayment, Appraisals, Cost sharing, Maintenance costs, Economic impact, Management, Operations research, Legislation, Project planning, Financing.

The proposed Estuarine Sanctuary Guidelines, issued by the National Oceanic and Atmospheric Administration, are designed to modify existing policy and procedures for the selection, acquisition, and management of estuarine sanctuaries. The guidelines create a new grant procedure, designed to reduce economic waste and to allow for greater cost specificity in Environmental Impact Statements. Under subsection 315(1) of the Coastal Zone Management Act, the Secretary of Commerce is authorized to make available to coastal states grants up to 50 per cent of the cost of acquisition, development, and operation of estuarine sanctuaries. The new guidelines establish a two-stage method of authorizing acquisition grants: first, a small preliminary acquisition grant may be authorized to develop the proposed sanctuary more fully; and second, an actual acquisition grant may follow. The preliminary grant covers the cost of surveying and assessment of the land to be acquired. The making of the actual acquisition grant depends on the research detailed in the preliminary grant. An operation grant may be authorized later. (Thomas-Florida)
W78-02826

COASTAL ZONE PROBLEMS: A BASIS FOR EVALUATION,
Washington Univ., Seattle. Dept. of Business, Government and Society.
For primary bibliographic entry see Field 6E.
W78-02829

TIDAL TITLE AND THE BOUNDARIES OF THE BAY: THE CASE OF THE SUBMERGED 'HIGH WATER' MARK,
Fordham Univ., Bronx, N.Y. School of Law.
For primary bibliographic entry see Field 6E.
W78-02843

REAL TIME SIMULATION OF NITROGEN CYCLE IN AN ESTUARY,
Resource Analysis, Inc., Cambridge, MA.
For primary bibliographic entry see Field 5B.
W78-03010

ANALYSIS OF ZOOPLANKTON POPULATION FLUCTUATIONS IN THE STRAIT OF GEORGIA, BRITISH COLUMBIA,
British Columbia Univ., Vancouver. Inst. of Oceanography.
For primary bibliographic entry see Field 5C.
W78-03014

BIOMASS PRODUCTION IN MASS CULTURES OF MARINE PHYTOPLANKTON AT VARYING TEMPERATURES,
Woods Hole Oceaographic Institution, MA.
For primary bibliographic entry see Field 5C.
W78-03018

DISTRIBUTION OF PLANKTONIC OSTRACODA (HALOPRIDIDAE) IN THE NORTH ADRIATIC WITH THE DESCRIPTION OF A NEW SUBSPECIES, CONCHOECIA PORRECTA ADRIATICA,
Institute of Oceaographic Sciences, Wormley (England).
For primary bibliographic entry see Field 5C.
W78-03019

CONSEQUENCES OF DETERGENT POLLUTION OF THE SEA: EFFECTS ON REGENERATING SPONGE CUBES OF GEODIA CYDONIUM,
Institut Rudjer Boskovic, Rovinj (Yugoslavia). Center for Marine Research.
For primary bibliographic entry see Field 5C.
W78-03025

INVESTIGATIONS OF ENERGY FLOW IN SEDIMENTS OF KIEL BAY (BALTIC SEA), (IN GERMAN),
Akademiya Nauk URSR, Kiev. Inst. Zoologii.
S. Boje-Volkmann.
Inst Rev Gesamten Hydrobiol 62(1), p 63-96, 1977.

Descriptors: *Sediments, *Baltic Sea(Kiel Bay), Oxygen consumption(Sediments), ATP, *Bacteria, Carbon, Chlorophyll, Detritus, Fauna, Germany, Nitrogen, Pheo, Pigments, West Germany.

Over a course of 1 yr total O2 consumption of sediment cores was determined for the period of 1 wk in a laboratory flow-through system. The cores were collected during different months of the year and at 2 localities. One of the areas, at about 1 m water depth near the beach, has a C demand of 160 gC/m2/yr. The other one at a water depth of 11 m, a very heterogeneous sediment with a large gravel fraction, had a C demand of 100 gC/m2/yr. As additional parameters for characterization of the sediments and interpretation of the determined metabolic rates particulate organic C and N, ATP, chlorophyll and pheopigment, bacterial counts and fauna composition were used. Both areas can be described as non detritus-accumulating sediments.
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W78-03029

ABYSSAL MEIOBENTHOS IN THE BAY OF BISCAY: I. CONSIDERATIONS ON QUANTITATIVE DATA, (IN FRENCH),
Centre d'Oceanographie, Marseille (France). Station Marine d'Endoume.
For primary bibliographic entry see Field 5A.
W78-03030

A QUANTITATIVE STUDY OF THE STRUCTURE AND DYNAMICS OF BENTHIC SUBTIDAL ALGAL VEGETATION IN GHANA (TROPHICAL WEST AFRICA),
Ghana Univ., Legon. Dept. of Botany.
For primary bibliographic entry see Field 5B.
W78-03037

ENERGY FLOW MODEL OF AN OXYGEN-DEFICIENT ESTUARY ON THE SWEDISH WEST COAST,
Swedish Water and Air Pollution Research Lab., Gothenberg.
For primary bibliographic entry see Field 5C.
W78-03067

EFFECTS OF A FRESHWATER EFFLUENT ON THE DEVELOPMENT OF BENTHIC COMMUNITIES IN A MARINE LAGOON, (IN FRENCH),
Centre d'Oceanographie, Marseille (France). Station Marine d'Endoume.
For primary bibliographic entry see Field 5C.
W78-03076

RESONANT SCATTERING BY A HARBOR WITH TWO COUPLED BASINS,
Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.
For primary bibliographic entry see Field 8B.
W78-03088

PROCESSES OF SEDIMENT TRANSPORT AND TIDAL DELTA DEVELOPMENT IN A STRATIFIED TIDAL INLET,
Louisiana State Univ., Baton Rouge. Coastal Studies Inst.
L. D. Wright, and C. J. Sonu.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A034 555, Price codes: A02 in paper copy, A01 in microfiche. Technical Report No. 221, to Office of Naval Research, Reprinted from: Estuarine Research, Vol 2, p 63-76, 1975, December 1976. 6 fig, 17 ref. ONR-N00014-75-C-0192.

Descriptors: *Sediment transport, *Deltas, *Estuaries, Florida, Stratification, Inlets(Waterways), Tidal deltas, Tidal inlets.

Flood-tidal and ebb-tidal deltas in East pass, on the northwestern coast of Florida, contrast sharply in form and absolute size. The flood-tidal delta, the more extensive, is characterized by a broad middle-ground shoal separating two diverging flood channels, whereas the ebb-tidal delta consists of a single seaward-narrowing channel flanked by subaqueous levees and having a symmetrical, crescentic, subaqueous bar at the outlet. Form differences result partially from variations in the intensities of different effluent expansion and deceleration mechanisms arising from vertical density stratification. Over the flood-tidal delta, bayward flood flow is concentrated near the bottom beneath lighter bay water. This inflow expands as a hyperpycnal effluent under the influence of bottom friction to produce the observed configuration of the flood-tidal delta. Because flood currents attain their velocity and duration maxima in the lower layer near the bottom, bed-load transport in the channels of the flood-tidal delta is flood-dominated. During ebb, outflow over the ebb-tidal delta is initially buoyant and is restricted to the upper layer as dense sea water intrudes into the inlet near the bottom. With increasing ebb velocities, the salt wedge is forced seaward to a stationary position over the bar front, and outflow in the region between the outlet and the bar crest becomes turbulent. This sequence is similar to that which characterizes the stratified mouths of the Mississippi between low and high river stages. The morphology of the ebb-tidal delta appears to be roughly analogous to that exhibited by stratified river mouths. (Sinha-OEIS)
W78-03089

NEARSHORE PROCESSES ON A FRINGING REEF,
Louisiana State Univ., Baton Rouge. Coastal Studies Inst.
J. N. Suhayda, H. H. Roberts, and S. P. Murray.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A038 108, Price codes: A02 in paper copy, A01 in microfiche. Technical Report No. 225 to Office of Naval Research, Reprinted from: Preprints-Third International Ocean Development Conference held Tokyo, Japan, August 5-8, 1975, Vol 5, p 63-75, December 1976. 6 fig, 1 tab, 32 ref. ONR-N00014-69-A-0211-0003.

Descriptors: *Reefs, *Sedimentation, *Geomorphology, *Waves(Water), Lagoons, Ocean currents, Ocean waves, *Nearshore processes, *Fringing reefs, Grand Cayman Island, Barbados, Wave height.

A field experiment was conducted on Grand Cayman island during 1972 and on Barbados during 1973 to determine the characteristics of wave-dominated nearshore processes in a fringing reef. Results from these field experiments indicate that nearshore processes on reefs occur in a distinctly different pattern from that on sandy coasts. Deep-water wave characteristics are significantly modified by reef morphology before the waves reach the shoreline. Shelf morphologic features produce a significant reduction in wave height, owing to the combined effects of friction, scattering and reflection, at a rate significantly greater than that occurring on sandy coasts. At the fringing reef crest energy loss resulting from breaking produces a substantial reduction in wave height which is accompanied by an extreme modification to the wave spectrum, including the introduction of multiple low-frequency peaks. Wave-induced currents cross the fringing reef crest and interact with lagoon geometry to produce a circulation pattern in the back-reef lagoon characterized by velocities which increase toward the main lagoon outlet. Sediment thickness within the lagoon decreases toward the lagoon opening and increases toward the shoreline. This pattern is in qualitative agreement with the generally predicted lagoon current movement. (Sinha-OEIS)
W78-03090

SEDIMENT TRANSPORT AND DEPOSITION IN A MACROTIDAL RIVER CHANNEL: ORD RIVER, WESTERN AUSTRALIA,
Louisiana State Univ., Baton Rouge. Coastal Studies Inst.
L. D. Wright, J. M. Coleman, and B. G. Thom.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A034 555, Price codes: A02 in paper copy, A01 in microfiche. Technical Report No. 219, to Office of Naval Research, Reprinted from: Estuarine Research, Vol 2, p 309-321, 1975, December 1976. 7 fig, 1 tab, 7 ref. ONR-N00014-75-C-0192.

Descriptors: *Sediment transport, *Deposition(Sediments), *Estuaries, *Rivers, *Tidal waters, *Australia, Bed load, *Tidal currents, *Ord River(Australia).

The funnel-shaped channel of the lower Ord River in Western Australia, experiences a semidiurnal spring-tide range of 5.9 meters. The tidal prism substantially exceeds river discharge throughout the lower 65 km of the channel, and most of the sediments contributed to the system by the river are transported and deposited by tidal currents. The tide wave is symmetrical at the mouth but becomes deformed upstream owing to a high amplitude/depth ratio. Accordingly, the velocity of flood currents increasingly exceeds ebb velocities upstream, whereas ebb flow increases in duration. In and seaward of the mouth, bed-load transports by flood- and ebb-tide currents are approximately equal. Linear subaqueous sand ridges parallel to tidal currents separate mutually evasive zones of flood- and ebb-dominated sediment transport and appear to be related to convergence of flood- and ebb-oriented bedforms. In response to the upstream increase in tide-wave asymmetry, the largest bedforms within the channel migrate upstream under the influence of flood currents. The upstream increase in asymmetry of the channel cross section and in channel sinuosity. This results in concentrating ebb flows in the decreased cross section of channels, where bed-load transport is ebb-dominated, thereby balancing the sediment budget. (Sinha-OEIS)
W78-03091

ARCTIC COASTAL PROCESSES: AN OVERVIEW,
Louisiana State Univ., Baton Rouge. Coastal Studies Inst.
For primary bibliographic entry see Field 2C.
W78-03093

AN ECOLOGICAL STUDY OF THE EFFECTS OF POWER PLANTS ON BENTHIC

MACROPLANT MICROCOSMS IN SUBTROPICAL AND TROPICAL ESTUARIES,
For primary bibliographic entry see Field 5C.
W78-03094

IMPLICATIONS OF THE U.S. COAST GUARD SEGREGATED BALLAST RETROFIT RULING ON IMPORT ALTERNATIVES AND POLLUTION OF THE MARINE ENVIRONMENT,
Operations Research, Inc., Silver Spring, MD.
For primary bibliographic entry see Field 5G.
W78-03099

PROBABILISTIC TRAJECTORY ASSESSMENTS FOR OFFSHORE OIL SPILLS IMPACTING LONG ISLAND,
Massachusetts Inst. of Tech., Cambridge.
For primary bibliographic entry see Field 5B.
W78-03100

AN ESTIMATE OF THE INFLUENCE OF SEDIMENT CONCENTRATION AND TYPE ON REMOTE SENSING PENETRATION DEPTH FOR VARIOUS COASTAL WATERS,
National Aeronautics and Space Administration, Langley Station, VA. Langley Research Center.
For primary bibliographic entry see Field 5A.
W78-03102

A COMPUTER ANALYSIS OF THE SPREAD OF POLLUTION ON LONG ISLAND BEACHES,
Brookhaven National Lab., Upton, NY. Dept. of Applied Science.
For primary bibliographic entry see Field 5B.
W78-03103

BASELINE STUDY PROGRAM, NORTH PUGET SOUND. BIOLOGICAL OIL IMPACT LITERATURE REVIEW: VOL I - TEXT,
Beak Consultants Inc., Portland, OR.
For primary bibliographic entry see Field 5C.
W78-03104

STUDIES AND INVESTIGATIONS OF THE FATE AND EFFECT OF THE SHELL OIL SPILL, PLATFORM B, BLOCK 26, SOUTH TIMBALIER BAY (DECEMBER 1, 1970 - NOVEMBER 30, 1971),
Resources Technology Corp., Houston, TX.
For primary bibliographic entry see Field 5C.
W78-03106

BASIC REMOTE SENSING INVESTIGATION FOR BEACH RECONNAISSANCE,
Environmental Research Inst. of Michigan, Ann Arbor.
F. Thomson, R. Shuchman, C. Wezernak, D. Lyzenga, and D. J. Leu.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A029 041, Price codes: A06 in paper copy, A01 in microfiche. Interim Report No. ERIM-108900-5-P, to Office of Naval Research, Geography Branch, Arlington, VA, July 1976. 125 p, 25 fig, 10 tab, 55 ref, 4 append. ONR-N00014-74-C-0273.

Descriptors: *Remote sensing, *Beaches, *Coasts, *Water pollution effects, Baseline studies, Water quality control, Pollution abatement, *Outer Continental Shelf.

Progress is reported on three tasks designed to develop remote sensing beach reconnaissance techniques applicable to the benthic, beach intertidal and beach upland zones. Task 1 is designed to develop remote sensing indicators of important beach composition and physical parameters which will ultimately prove useful in models to predict beach conditions. Task 2 is designed to develop remote sensing techniques for survey of bottom features in the benthic zone. Task 3 is designed to develop radar processing techniques to delineate important beach intertidal and upland parameters and to better understand the potential of radar-derived information when used with optical sensor data. (Sinha-OEIS)
W78-03107

A NUMERICAL OIL TRAJECTORY FORECAST MODEL USED TO ASSESS THE HAZARD TO LONG ISLAND BEACHES FROM OIL ENTERING THE NEW YORK BIGHT APEX FROM FEBRUARY 11-24, 1977,
Brookhaven National Lab., Upton, NY. Dept. of Applied Science.
For primary bibliographic entry see Field 5B.
W78-03109

SALT FLUX AND EDDY STRESSES IN A SHALLOW ESTUARY OF HIGH TIDAL RANGE,
Louisiana State Univ., Baton Rouge. Coastal Studies Inst.
S. P. Murray.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A028 842, Price codes: A02 in paper copy, A01 in microfiche. Technical Report No. 209, June 1976. 8 p, 1 tab, 6 ref. Reprinted from: Conference on Marine and Freshwater Research in Southern Africa, Port Elizabeth, South Africa, July 1976. ONR-N00014-75-C-0192.

Descriptors: *Estuaries, *Mixing, *Tidal effects, *Salinity, *Eddies, *Ecuador(Rio Guayas estuary), Tidal currents.

Detailed measurements over a tidal cycle of salinity and current speed were taken across a section of the high-tidal-range, shallow estuary of the Rio Guayas in Ecuador. Despite a low freshwater discharge and intense mixing by the strong tidal currents, an ideal well mixed estuary does not develop; a weak vertical salinity gradient persists along the channel. A decomposition of the time-averaged salt flux into 18 terms accounting for the mean advective salt flux, changing cross-sectional area, vertical and lateral gradients in speed and salinity, and time deviations from the time means show that 87% of the total downstream salt flux is accounted for by the freshwater discharge but that 61% of the upstream salt flux necessary to maintain the salt balance is produced by upstream turbulent diffusive flux. This high value for he diffusive flux is predicted by the theories of Hansen and Rattray. Gravitational convection and lateral shear effects make unimportant contributions to the salt balance. Further computations are made of the temporal and spatial variations of the eddy stresses in the channel. The role of the time-dependent nature of the cross-sectional area on the structure of the eddy stresses is isolated for the first time. (Sinha-OEIS)
W78-03111

WATER QUALITY OF TAMPA BAY, FLORIDA: WET-WEATHER CONDITIONS, OCTOBER 1971,
Geological Survey, Tampa, FL. Water Resources Div.; and Geological Survey, Lawrence, KS. Water Resources Div.
For primary bibliographic entry see Field 5A.
W78-03128

COMPUTER SIMULATION OF TWO-DIMENSIONAL UNSTEADY FLOWS IN ESTUARIES AND EMBAYMENTS BY THE METHOD OF CHARACTERISTICS--BASIC THEORY AND THE FORMULATION OF THE NUMERICAL METHOD,
Geological Survey, Reston, VA. Water Resources Div.
C. Lai.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-273 162, Price codes: A05 in paper copy, A01 in microfiche. Water-Resources Investigations 77-85, August 1977. 72 p, 12 fig, 2 tab, 16 ref.

Descriptors: *Model studies, *Unsteady flow, *Estuaries, *Computer programs, *Numerical analysis, Shallow water, Mathematical models, Analytical techniques, Computer models, Flow characteristics, Two-dimensional flow, Specified-time-interval scheme, Second-order approximation.

Two-dimensional unsteady flows of homogeneous density in estuaries and embayments can be described by hyperbolic, quasi-linear partial differential equations involving three dependent and three independent variables. A linear combination of these equations leads to a parametric equation of characteristic form, which consists of two parts: total differentiation along the bicharacteristics and partial differentiation in space. For its numerical solution, the specified-time-interval scheme has been used. The unknown, partial space-derivative terms can be eliminated first by suitable combinations of difference equations, converted from the corresponding differential forms and written along four selected bicharacteristics and a streamline. Other unknowns are thus made solvable from the known variables on the current time plane. The computation is carried to the second-order accuracy by using trapezoidal rule of integration. Means to handle complex boundary conditions are developed for practical application. Computer programs have been written and a mathematical model has been constructed for flow simulation. The favorable computer outputs suggest further exploration and development of model worthwhile. (Woodard-USGS)
W78-03130

ASPECTS OF THE VIRAL CONTAMINATION OF SEA WATER: PRELIMINARY RESULTS, (IN ITALIAN),
Messina Univ. (Italy). Inst. of Hygiene.
For primary bibliographic entry see Field 5B.
W78-03147

TUNICATE SPECIES AS MARINE POLLUTION INDICATORS,
Democritus Nuclear Research Center, Athens (Greece). Chemistry Dept.
For primary bibliographic entry see Field 5B.
W78-03148

3. WATER SUPPLY AUGMENTATION AND CONSERVATION

3A. Saline Water Conversion

THE APPLICATION OF WIND ENERGY SYSTEMS TO DESALINATION,
Williamson Engineering Associates, Inc., Navarre, FL.
E. A. Cadwallader, J. E. Westberg, and W. R. Williamson.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-276 174, Price codes: A04 in paper copy, A01 in microfiche. Report No. OWRT/S--78/1, April 22, 1977. 59 p, 21 fig, 7 tab, 15 ref, 2 append. 14-34-0001-7523.

Descriptors: *Desalination, Desalination processes, *Wind energy, Energy, Winds, *Membrane processes, Brackish water, *Electric power costs, Electric power production, *Wind turbines, Potable water, Electrodialysis, Reverse osmosis.

The impact of rapidly increasing fuel costs has all but made saline water conversion uneconomical. However, the application of wind energy systems to membrane processes for brackish water conversion offers an economical solution. Commercially

available wind turbines and those under development appear promising for producing electrical energy at costs ranging from five cents down to 1.8 cents per kilowatt hour. It is still possible to reach costs for desalting brackish water at less than $1.00 per thousand gallons with large wind energy/desalination systems. The coupling of wind energy turbines to electrodialysis and reverse osmosis also offers technological advantages, such as variable energy outputs from wind turbines, to optimize variable fluid flows in the desalination processes for maximum, economic production of potable water. Research and development efforts in this direction are indicated.
W78-02701

PURIFICATION OF SALINE WATER,
D. R. Anderson.
U.S. Patent No. 4,036,749, 9 p, 2 fig, 18 ref; Official Gazette of the United States Patent Office, Vol 960, No 3, p 1270, July 19, 1977.

Descriptors: *Patents, *Water treatment, *Water purification, *Desalination, *Separation techniques, Scaling, Water reuse, Dissolved solids, Chemical precipitation, Pre-treatment(Water).

A method for the pretreatment of water is useful in combination with a subsequent processing involving concentration of the water such as a desalinazation process, e.g., distillation, reverse osmosis, vapor compression, electrodialysis, freezing, ion exchange, etc., or use of the water in evaporative cooling or as boiler feedwater. The pretreatment method as applied to ay of these processes results in a substantial decrease in the scale-depositing impurities of the water prior to the salt concentrating steps of the water processes. The method also utilizes precipitants obtained and is therefore substantially self-sufficient in reagents. The method of the invention comprises the pretreatment of water prior to its use or subsequent treatment, e.g., desalinization, by the addition of a sufficient quantity of magnesium hydroxide and any necessary carbonate source, e.g., carbon dioxide, to the raw water to precipitate a substantial quantity of the dissolved calcium present as insoluble calcium carbonate. The calcium carbonate is recovered, converted to calcium hydroxide which is used as the reagent to treat the brine separated during the desalinization process and to recover magnesium hydroxide. The recovered magnesium hydroxide can then be employed as the precipitant for the precipitation of the calcium as insoluable calcium carbonate from the raw water. (Sinha-OEIS)
W78-02910

NEW ASPECTS OF CLOSED-UP PAPERMAKING SYSTEMS,
Sulzer Bros. Ltd., Winterthur (Switzerland).
For primary bibliographic entry see Field 5D.
W78-03188

3B. Water Yield Improvement

THE APPLICATION OF POLYMERS TO INCREASE SOIL PERMEABILITY, (IN RUSSIAN),
Moscow State Univ. (USSR). Dept. of Soil Melioration; and Moscow State Univ. (USSR). Dept. of Physics.
For primary bibliographic entry see Field 2G.
W78-03055

3C. Use Of Water Of Impaired Quality

WEISER-LOWER PAYETTE WATER QUALITY SURVEYS,
Environmental Protection Agency, Seattle, WA. Region X.
For primary bibliographic entry see Field 5A.
W78-02994

3D. Conservation In Domestic and Municipal Use

IMPACTS OF THE WESTERN DROUGHT ON REGIONAL ELECTRICITY GENERATION.
Federal Power Commission, Washington, DC.
For primary bibliographic entry see Field 3E.
W78-02879

TECHNOLOGY IS NOT ENOUGH: THE PROVISION AND MAINTENANCE OF APPROPRIATE WATER SUPPLIES,
For primary bibliographic entry see Field 6B.
W78-03059

3E. Conservation In Industry

THE APPLICATION OF WIND ENERGY SYSTEMS TO DESALINATION,
Williamson Engineering Associates, Inc., Navarre, FL.
For primary bibliographic entry see Field 3A.
W78-02701

RESEARCH PROGRAM ON HAZARD PRIORITY RANKING OF MANUFACTURED CHEMICALS. PHASE II. (CHEMICAL 61-79),
Stanford Research Inst., Menlo Park, CA.
For primary bibliographic entry see Field 5B.
W78-02878

IMPACTS OF THE WESTERN DROUGHT ON REGIONAL ELECTRICITY GENERATION.
Federal Power Commission, Washington, DC.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-273 556, Price codes: A07 in paper copy, A01 in microfiche. Joint FEA/FPC Interim Report No. FEA/D-77/128, March 1977. 117 p, 4 fig, 10 tab, 6 append.

Descriptors: *Electricity, *Droughts, *Water shortage, *Hydroelectric power, Electrical networks, California, Idaho, Oregon, Washington, Hydroelectric plants, Electric power, Electric power demand, Electric power production, Hydroelectricity, Power deficiency, Energy conservation, Emergencies, Contingency planning.

Projected electrical demand and power supply situation in the Western United States, generally, and in the states of Washington, Oregon, Idaho, and California, particularly, were examined for the summer of 1977, noting the impact of the precceding period of drought. The hydro-electric deficiency for summer 1977 (June through September), based on 1976 projections for the region, was estimated to range as high as 19,000 gigawatthours, depending upon spring precipitation for the total U.S. portion of the Western Systems Coordination Council (WSCC) area. For the period considered, the deficiency could have been as high as 39% of the hydroenergy production projected in April 1976. Suggested methods to combat the deficiency included curtailments of interruptible customers; reduction of customer energy use, to be achieved by voluntary and state mandated conservation; and voltage reduction or rotating disconnections of service by the utilities, amounting to about 5% of the projected firm load. However, the balance of the deficiency was to be supplied by fossil fuel plant generation at higher costs to the customer. Recommendations were made for measures to ameliorate problems anticipated, such as conservation of both electricity and water. Appendices describe installed capacities and distribution by type of the WSCC region, current water conditions, drought impacts on electricity situations in specific northwestern U.S. regions, California's thermal generating capacity, other generating facilities, and system contingency procedures in a long-term emergency. (Wares-IPA)
W78-02879

INDUSTRIAL PROCESS PROFILES FOR ENVIRONMENTAL USE CHAPTER 1, INTRODUCTION,
Radian Corp., Austin, TX.
For primary bibliographic entry see Field 5B.
W78-02881

ECONOMIC ANALYSIS OF EFFLUENT GUIDELINES FOR THE SOAP AND DETERGENT INDUSTRY. PHASE I,
Environmental Protection Agency, Washington, DC. Office of Planning and Evaluation.
For primary bibliographic entry see Field 5G.
W78-03053

TECHNOLOGY IS NOT ENOUGH: THE PROVISION AND MAINTENANCE OF APPROPRIATE WATER SUPPLIES,
For primary bibliographic entry see Field 6B.
W78-03059

NATURAL RESOURCES POLICY 1975-1985,
New Mexico Univ., Albuquerque. Dept. of Economics.
For primary bibliographic entry see Field 6E.
W78-03083

TREATING WASTEWATER FOR RECYCLING,
Ecodyne Corp., Union, NJ. Industrial Wastewater Div.
For primary bibliographic entry see Field 5D.
W78-03176

ROTATING DISC WASTE TREATMENT SYSTEM MAKES LOW HP DEMANDS, OCCUPIES 1/3 THE SPACE OF PONDS,
Lion Oil Co., Martinez, CA. Avon Refinery.
For primary bibliographic entry see Field 5D.
W78-03186

NEW ASPECTS OF CLOSED-UP PAPERMAKING SYSTEMS,
Sulzer Bros. Ltd., Winterthur (Switzerland).
For primary bibliographic entry see Field 5D.
W78-03188

WATER TREATMENT AND RECYCLING IN A PAPER MILL (RECYCLAGE ET TRAITEMENT DES EAUX DANS UNE PAPETERIE),
For primary bibliographic entry see Field 5D.
W78-03189

ENVIRONMENTALLY SOUND PAPER TECHNOLOGY (UMWELTFREUNDLICHE PAPIERTECHNOLOGIE),
Technische Univ., Darmstadt (West Germany). Waser- und Abwasserforschungsstelle; and Technische Univ., Darmstadt (West Germany). Inst. fuer Paperfabrikation.
For primary bibliographic entry see Field 5D.
W78-03190

THE IMPORTANCE OF THE 'EFFLUENT-FEE-LAW' EXEMPLIFIED BY THE CALCULATION FORMULA FOR THE PULP INDUSTRY (DIE BEDEUTUNG DES ABWASSERABGABENGESETZES NACH MASSGABE DER BEMESSUNGSFORMEL FUER DIE ZELLSTOFFINDUSTRIE),
Papierwerke Waldhof-Aschaffenburg A. G., Raubling (Switzerland).
For primary bibliographic entry see Field 5G.
W78-03191

RAYONIER SPENDS BIG FOR SULFITE RECOVERY.
For primary bibliographic entry see Field 5D.
W78-03192

POLLUTION ABATEMENT=GOOD HOUSEKEEPING=ENERGY/MATERIAL CONSERVATION,
For primary bibliographic entry see Field 5D.
W78-03196

A REVIEW OF THE STATE OF THE ART, (TREATMENT FACILITIES).
For primary bibliographic entry see Field 5D.
W78-03197

FRP TOWER IS KEY PART OF MILL'S RECOVERY UNIT.
For primary bibliographic entry see Field 5D.
W78-03199

3F. Conservation In Agriculture

TIME-LIMITED WATER PERMITS: LEGAL AND ECONOMIC CONSIDERATIONS,
Oklahoma City Univ., School of Law.
R. W. Andersen, and L. F. Rogers.
Gonzaga Law Review, Vol 12, No 2, p 193-230, Winter 1977.

Descriptors: *Water permits, *Irrigation permits, *Water rights, *Washington, *Water allocation(Policy), Irrigable land, Irrigation effects, Administrative agencies, Agriculture, Agricultural runoff, Legal aspects, Land development, Environmental effects, Irrigation efficiency, Regulation, Water utilization, Cost allocation, Economic efficiency, Water distribution(Applied), Permits, Farms, Equitable apportionment, Beneficial use.

Time-limited water permits, issued by the Department of Ecology, are the subject of debate in the state of Washington. The term permits are designed to deal with the increasing demand for the finite water supply from both agricultural and nonagricultural factions. There are competing interests involved. There is an economic interest in maximum efficiency which may be adverse to conservation interests. Economic growth often conflicts with the public interest. The problems are diverse: determining who gets a term permit and who gets a life permit; allocating permits between private and public enterprise; the effects of agricultural irrigation on neighboring states' water supplies. The Water Code of 1917 and the Water Resources Act of 1971 have supplied guidance in the past. In 1976 administrative regulations were developed in response to legislative inaction. The problem at present is in determining who gets preferred status and why. Although public irrigation operations and family farms are currently favored for term permits, such treatment is not supported by either legislation or administrative regulations. The Washington legislature should act to integrate private irrigation development and corporate farming into the term permit system. It should also clarify what right Washington has to interstate water supplies. (Thomas-Florida)
W78-02842

FARMERS INVESTMENT COMPANY V. BETTWY: A JUDICIAL RESTRICTION OF GROUND WATER WITHDRAWALS, COERCING THE ARIZONA LEGISLATURE TO ACT,
For primary bibliographic entry see Field 6E.
W78-02846

THE WATER DEPLETION DEDUCTION IN KANSAS, ITS STATUS AND PROSPECTIVE USE,
For primary bibliographic entry see Field 6E.
W78-02851

OBSERVATIONS ON LONG-TERM FERTILITY OF CULTIVATED SOILS AT GRIMARI (CENTRAL AFRICAN REPUBLIC): RESULTS OF SEMI-INTENSIVE MECHANIZED CULTIVATION TESTS ON MODERATELY DESATURATED RED FERRALITIC SOILS IN THE SUDANO-GUINEAN CLIMATE OF CENTRAL AFRICA,
For primary bibliographic entry see Field 2G.
W78-02867

END-CONTROL AGRICULTURAL SPRINKLER IRRIGATION SYSTEM,
G. Vollmer.
U.S. Patent No. 4,016,902, 9 p, 10 fig, 2 ref; Official Gazette of the United States Patent Office, Vol 957, No 2, p 548, April 12, 1977.

Descriptors: *Patents, *Irrigation, *Sprinkler irrigation, *Irrigation practices, *Irrigation efficiency, Control, Application equipment.

The invention concerns an agricultural sprinkler irrigation system in which a mover unit, equipped with power drive, is located intermediate the length of a sprinkler-carrying pipeline made up of coupled, wheel-mounted sections that are rotated in unison by the power drive during movement of the system from place to place in an area to be irrigated. Effective control for various types of center-powered, agricultural sprinkler irrigation systems is provided by combining control mechanisms, placed between the pipeline and themover unit for transmitting rectilinear movement of a rotating member as rectilinear movement of a non-rotating member; a switch assembly mounted on the mover unit in association with and to control operation of the power drive; operating means associated with the movement-transmitting means; and a control line mounted on and extending along the pipeline to or near one end for operating the operating means to effect actuation of the switch assembly. (Sinha-OEIS)
W78-02893

WATER SCREEN,
R. A. Hensley.
U.S. Patent No. 4,017,394, 5 p, 5 fig, 9 ref; Official Gazette of the United States Patent Office, Vol 957, No 2, p 711, April 12, 1977.

Descriptors: *Patents, *Irrigation, *Irrigation practices, *Filtration, Water delivery, Water conveyance, Engineering structures, Hydraulic structures, Filters.

A water screen is provided which as a stream-powered rotary filter member which can be positioned in running water to facilitate the removal of filtered water for irrigation purposes. A filter in the form of a cylindrical perforated drum is rotatably mounted on a frame which is supported by a float in a river or stream. The drum has a means to rotate itself by using power of the moving water. A conduit mounted with the frame and extending into the drum provides a filtered inlet for a conduit to an irrigation pump at a remote location. Moving water of the stream or river rotates the drum, thus passing debris around the drum and clear of the inlet to the conduit. In use the drum is positioned in a partially submerged condition and the means to rotate the drum rotate it regardless of whether or not water is being pumped from the interior of the drum. (Sinha-OEIS)
W78-02896

IRRIGATION APPARATUS,
R. E. Diggs.
U.S. Patent No. 4,017,958, 7 p, 11 fig, 3 ref; Official Gazette of the United States Patent Office, Vol 957, No 3, p 908, April 19, 1977.

Descriptors: *Patents, *Irrigation, *Irrigation practices, *Irrigation efficiency, Irrigation effects, Application equipment, Pipes, Drip irrigation, Drip emitters.

This invention relates to a trickle type irrigation system and to fittings for use so that irrigating water is caused to trickle or drip in a controlled root zone area to be irrigated at a very low rate of flow. The apparatus is usable either above the surface of the ground or below the surface. The drip emitter is a simple calibrated orifice fitting with a shrouded discharge with a piercing means on one end for quick and easy connection to a plastic water supply pipe. The shroud prevents a spray of water and instead, the water strikes the shroud and is caused to fall in a puddle. The drip emitters are provided in several sizes, color coded, for use in hilly terrain or on long irrigation lines where excessive pressure drop is encountered. A special tool is described for use in installing the drip emitter to a plastic line. (Sinha-OEIS)
W78-02899

RESILIENT SPRINKLER RISER,
Michener Associates, Inc., Pasco, WA. (Assignee).
G. D. Barichello.
U.S. Patent No. 4,018,386, 5 p, 3 fig, 6 ref; Official Gazette of the United States Patent Office, Vol 957, No 3, p 1053, April 19, 1977.

Descriptors: *Patents, *Irrigation, *Sprinkler irrigation, *Irrigation efficiency, *Irrigation practices, Application equipment, Mechanical properties, Flexibility.

A resilient sprinkler riser is described for mounting a pulsating type sprinkler head where a nozzle is utilized to direct a spray jet of water in a radial direction from a vertical axis of rotation while a pivoted deflector member operates to rotate the nozzle about the vertical axis. The riser includes a flexible tube that is coaxially mounted within an elongated closed helical tension spring. The spring is fastened at its lower end relative to the tube while its upper end is free to slide coaxially over the tube length. The spring is pretensioned to hold the pipe in an upright condition under the reaction forces exerted by a jet of water exiting through the sprinkler nozzle. However, the spring tension is not sufficient to hold the tube in an upright condition when excessive external lateral forces are applied (i.e. an animal or vehicle coming into contact with the sprinkler head or riser body). When this happens, the riser will deflect in the direction of the force. When the force is removed, the riser will spring back to a normal upright condition. (Sinha-OEIS)
W78-02900

WATER SPRINKLER OPERATED BY REGULARLY VARYING WATER PRESSURE,
F. N. Palma.
U.S. Patent No. 4,019,686, 7 p, 7 fig, 4 ref; Official Gazette of the United States Patent Office, Vol 957, No 4, p 1469, April 26, 1977.

Descriptors: *Patents, *Irrigation, *Sprinkler irrigation, *Irrigation efficiency, Irrigation practices, Application equipment, Water delivery, Distribution patterns.

A sprinkler system is provided which can lay down a uniform amount of precipitation upon an odd shaped surface area. This is accomplished by a combination of a plate member having the pattern of the area to be watered and a decoding plate, operated by a stepping mechanism. The patterned plate is situated adjacent to a slotted opening in the lower solid side of a hollow head moveable under water pressure within a cavity formed between the base and a cap of the sprinkler. A nozzle is attached to the upper end of the head to distribute the water passing the restricting window and segment of pattern places in its path in the base. Springs are associted with the head to provide a torque to the sprinkler head as the head rises in the cavity under pressure of the water on the lower side of the head. A gear and ratchet is provided on the head to prevent the head from returning to the

first position upon reduction of the water pressure and resultant reaction of the springs to return the head to its position of rest within the cavity. (Sinha-OEIS)
W78-02904

DRIP IRRIGATION EMITTER,
G. J. Pecaro.
U.S. Patent No 4,036,435, 6 p, 6 fig, 8 ref; Official Gazette of the United States Patent Office, Vol 960, No 3, p 1171, July 19, 1977.

Descriptors: *Patents, *Irrigation, *Irrigation practices, *Irrigation efficiency, Application equipment, Rates of application, Flow control, Fertilization, *Drip irrigation.

An improved emitter design permits the application of water to plants and trees at a predetermined constant flow rate over a wide range of incoming water pressures. The emitter is constructed of an elongated hollow body, one end of which contains an inlet connector for receiving incoming water and/or fertilizer solution. The other end of the emitter body is fitted with a fluid flow adjusting capping mechanism. A pin, with a tapered end functioning as a reamer, is attached to the emitter and extends axially within the interior of the hollow body. A collar is positioned about the tapered end of the pin, the collar being axially movable to form a varying volume orifice for fluid flow between the collar and the pin. Sealing means are provided to prevent fluid flow between the interior body walls and the collar, thereby preventing fluid flow between the inlet and outlet other than through the orifice. A spring member, constrained between the adjustable capping member and the collar creates an axial force on the collar, forcing it in a direction to close the orifice in the absence of incoming water. (Sinha-OEIS)
W78-02907

SELF-PROPELLED LINEAR IRRIGATION SYSTEM,
N. S. Standal.
U.S. Patent No 4,036,436, 15 p, 16 fig, 8 ref; Official Gazette of the United States Patent Office, Vol 960, No 3, p 1171, July 19, 1977.

Descriptors: *Patents, *Irrigation, *Irrigation systems, *Irrigation efficiency, *Distribution systems, Lateral conveyance systems, Water distribution(Applied), Sprinkler irrigation.

A self-propelled linear irrigation system is propelled by a high pressure fluid, pneumatic or hydraulic. Energy storage means are provided so that the system can be propelled while disconnected from any supply line. The main tractor has automatic coupling members for coupling to the water supply and compressed air supply and automatically propels itself from one compressed air and water station to the next compressed air and water station along a main supply line. The main tractor travels along a linear guide system, which may be the main water supply line and/or a compressed air line or alternatively a separate guide means such as a taut cable. The tractor has a rigid, central section supported on wheels or other transport means, with interconnecting means between the central section and a line move. (Sinha-OEIS)
W78-02908

EVALUATION OF ARID ZONE SOILS FOR THE PURPOSE OF IRRIGATION, (IN RUSSIAN),
For primary bibliographic entry see Field 2G.
W78-03150

IRRIGATION EROSION OF LANDS AND ITS CONTROL, (IN RUSSIAN),
For primary bibliographic entry see Field 2J.
W78-03151

4. WATER QUANTITY MANAGEMENT AND CONTROL

4A. Control Of Water On The Surface

PROCEEDINGS, RESEARCH PLANNING CONFERENCE ON THE AQUATIC PLANT CONTROL PROGRAM, 19-22 OCTOBER 1976.
Army Engineer Waterways Experiment Station, Vicksburg, MS.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A044 590, Price codes: A14 in paper copy, A01 in microfiche. Miscellaneous Paper A-77-3, August 1977. 322 p.

Descriptors: *Aquatic plants, *Aquatic weed control, Water hyacinth, White amur, Macrophyte sampling, *Water analysis, *Water quality, Herbicides, Remote sensing.

Contains 37 papers on aquatic plant control that were given at this conference. Some of the subjects covered are U.S. Corps of Engineers involvement in aquatic plant research, water hyacinth infestation, white amur research, macrophyte sampling, water quality analysis, response of hydrilla to herbicides, and remote sensing of aquatic plants. (WES)
W78-02757

A MANAGEMENT PROCEDURE FOR THE INTRODUCTION OF BIOLOGICAL AGENTS FOR CONTROL OF AQUATIC PLANTS,
Army Engineer Waterways Experiment Station, Vicksburg, MS.
W. E. Grabau.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A041 302, Price codes: A03 in paper copy, A01 in microfiche. Miscellaneous Paper A-77-2, June 1977. 36 p, 1 fig.

Descriptors: *Aquatic weed control, *Aquatic plants, *Biocontrol, Environmental engineering, Management.

The entire process of introducing a biological control agent for control of a problem aquatic plant species is complex and lengthy. All of it is governed by regulations and sound scientific procedures. A management concept for accomplishing the procedures has been developed for use by those responsible for aquatic plant control using biological agents. (WES)
W78-02758

A CONCEPT FOR THE DEVELOPMENT OF LONG-TERM MANAGEMENT PLANS FOR AQUATIC PLANT CONTROL,
Army Engineer Waterways Experiment Station, Vicksburg, MS.
D. R. Sanders, and J. L. Decell.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A041 301, Price codes: A03 in paper copy, A01 in microfiche. Miscellaneous Paper A-77-1, June 1977. 24 p, 1 fig.

Descriptors: *Aquatic plants, *Aquatic weed control, Environmental engineering, Management, Evaluation, Planning, Project planning, Water quality control.

This paper describes a general concept that will serve as a basis for developing well-conceived aquatic plant management plans, as well as a step-by-step guide for implementing measures for long-term aquatic plant control while giving proper consideration to their potential long-term effects on the environment. More specifically, the concept provides a procedure for federal, state, and local agencies to use in the systematic assessment of the aquatic plant problem in a water body, the objective evaluation of all potential control measures, the consideration of water body user demands and environmental constraints, and the development of an operational plan including provisions for monitoring and updating. (WES)
W78-02759

EFFECT OF LOSS OF VALLEY STORAGE IN THE CANNELTON POOL ON OHIO RIVER FLOOD HEIGHTS,
Army Engineer Waterways Experiment Station, Vicksburg, MS.
For primary bibliographic entry see Field 8B.
W78-02760

A COMPUTER-AIDED AERIAL PHOTOGRAPHIC ANALYSIS OF FIRE ISLAND INLET GEOMORPHOLOGY,
Army Engineer Waterways Experiment Station, Vicksburg, MS.
J. H. Barwis, F. C. Perry, and V. E. LaGarde.
Available from the National Technical Information Service, Springfield, VA 22161 as ADA-045 187, Price codes: A05 in paper copy, A01 in microfiche. Miscellaneous Paper H-77-12, September 1977. 82 p, 16 fig, 19 tab, 1 append.

Descriptors: *Aerial photography, Surveys, *Geomorphology, Computers, New York, *Channels, Dredging, *Fire Island Inlet(NY).

In order to provide information on channel location and configuration and assist in planning of dredging operation, the geometry of Fire Island Inlet, New York, is analyzed. using the 18 sets of aerial photographs taken between April 1962 and April 1972, the locations of shoals, beaches, and channels were determined, digitized for computer analysis, and displayed on drum plots. One of two channel locations proposed by the New York District is considered more appropriate in terms of matching the average channel location. (WES)
W78-02761

A FIELD TEST OF SELECTED INSECTS AND PATHOGENS FOR CONTROL OF WATERHYACINTHS; REPORT 1, PRELIMINARY RESULTS FOR THE 1975-76 SEASON,
Army Engineer Waterways Experiment Station, Vicksburg, MS.
E. E. Addor.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A044 392, Price codes: A04 in paper copy, A01 in microfiche. Technical Report A-77-2, September 1977. 54 p, 9 fig, 6 tab, 18 ref, 2 append.

Descriptors: *Aquatic plants, *Aquatic weed control, *Insects, *Pathogenic fungi, *Water hyacinth, Louisiana, *Lake Concordia(La), Water quality control.

During the growing season of 1975, a field experiment was initiated on Lake Concordia, Louisiana, to test the potential effectiveness of selected organisms as control agents against waterhyacinths, Eichhornia crassipes (Mart.) Solms. This report describes the experiment, presents the collected data, and summarizes the observations. Statistical analyses and interpretation of the data are also presented. Preliminary indications are that significant reductions in the growth rate or total accumulation of waterhyacinth mass in the test plots were not achieved by any of the treatment combinations during the first season's tests, but the potential for some of the treatments to effect the desired control began to emerge during the second year of observations. Appendix A discusses the life systems of the control organisms; Appendix B discusses the flowering activity of the waterhyacinths. (WES)
W78-02766

GEOMETRIC PARAMETERS THAT INFLUENCE FLOODPLAIN FLOW,
Army Engineer Waterways Experiment Station, Vicksburg, MS.
For primary bibliographic entry see Field 8B.
W78-02767

FREEZE-THAW ENHANCEMENT OF THE DRAINAGE AND CONSOLIDATION OF FINE-GRAINED DREDGED MATERIAL IN CONFINED DISPOSAL AREAS,
Cold Regions Research and Engineering, Hanover, NH.
E. J. . Chamberlain, and S. E. Blouin.
Available from the National Technical Information Service, Springfield, VA 22161 as ADA-046 400, Price codes: A05 in paper copy, A01 in microfiche. Army Engineer Waterways Experiment Station, Vicksburg, Mississippi, Technical Report D-77-16, October 1977. 85 p, 61 fig, 20 ref, 2 append.

Descriptors: *Consolidation, *Drainage, *Freeze-thaw tests, Permeability, *Great Lakes region, *Dredged material.

Fine-grained dredged material obtained from disposal sites in the Great Lakes region was subjected to controlled freeze-thaw cycling in a special laboratory consolidometer. Volume changes and permeabilities were observed after full consolidation and freeze-thaw cycling for applied pressures in the range of 0.93 to 30.73 kPa. It was observed that as much as 20 percent or more volume reduction results when dredged material with liquid limits in the range of 60 to 90 percent is subjected to one cycle of freezing and thawing. The degree of overconsolidation by freezing and thawing appears to decrease with increasing amounts of coarse materials and with increasing plasticity. The vertical permeability of all materials examined was increased as much as two orders of magnitude, the greatest increase in permeability occurring for the fine-grained materials at the lowest stress levels. The application of the phenomenon of overconsolidation by freezing and thawing to disposal sites is discussed and site management procedures are suggested. (WES)
W78-02777

STREAMFLOW SIMULATION-A MODEL BASED ON CANNONICAL EXPANSIONS,
Indian Inst. of Tech., New Delhi. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2E.
W78-02790

ASYMPTOTIC DISTRIBUTION OF MAXIMUM DEFICIT FOR LINEARLY DEPENDENT INFLOWS IN FULL FLOW REGULATION,
Engineering Consultants, Inc., Denver, CO.
For primary bibliographic entry see Field 2E.
W78-02791

RUN-SUMS OF ANNUAL FLOW SERIES,
Technical Univ. of Istanbul (Turkey). Dept. of Hydraulic and Water Power.
Z. Sen.
Journal of Hydrology, Vol 35, No 3/4, p 311-324, November 1977. 1 fig, 2 tab, 7 ref.

Descriptors: Water resources, *Reservoirs, *Flow, *Model studies, Mathematical models, Markov processes, Statistical models, Correlation analysis, Drainage, Storage, Discharge(Water), Rainfall, Precipitation(Atmospheric), Precipitation excess, Probability, Temporal distributions, Hydrology.

One of the main problems in water resources system design is to predict the total amount of water available over an operational period of the project considered. For instance, in reservoir design, if the total amount of water is in excess of the demand, the excess water will be stored; whereas during a deficit period, the extraction of water is necessary, either from the previously stored water in the reservoir or/and if possible, from alternative water resources. Thus, the accumulated water excess plays an important role in the reservoir design. A general methodology which is very useful for determining various run-sum properties of a given hydrologic process was developed on the basis of the random sum of random variables. Application of the method to some independent and dependent processes was given. (Sims-ISWS)
W78-02792

A PARAMETRIC APPROACH TO STATION WEIGHTS,
Indian Inst. of Tech., Kanpur. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2E.
W78-02793

DESIGN OF REPRESENTATIVE AND KEY RAINGAUGE STATIONS NETWORK FOR FLOOD FORECASTING IN YAMUNA AND DAMODAR RIVERS,
Meteorological Office, New Delhi (India).
For primary bibliographic entry see Field 2B.
W78-02797

ESTIMATION OF LOW RETURN PERIOD FLOODS,
Institute of Hydrology, Wallingford (England).
For primary bibliographic entry see Field 2E.
W78-02799

ACCURACY OF SYNTHETIC HYDROGRAPHS DERIVED FROM REPRESENTATIVE BASINS,
Canterbury Univ., Christchurch (New Zealand). Dept. of Civil Engineering.
For primary bibliographic entry see Field 2E.
W78-02801

TOPOLOGICAL PROPERTIES OF SOME TRELLIS PATTERN CHANNEL NETWORKS,
Cold Regions Research and Engineering Lab., Hanover, NH.
For primary bibliographic entry see Field 8B.
W78-02818

THE MARSHLAND ISSUE: LEGISLATIVE COMPENSATION FOR LOSSES RESULTING FROM GOVERNMENTAL LAND USE REGULATIONS -- FROM INVERSE CONDEMNATION TO PRODUCTIVE USE,
For primary bibliographic entry see Field 6E.
W78-02853

THE TAKINGS ISSUE IN A NATURAL SETTING: FLOODLINES AND THE POLICE POWER,
Tennessee Univ., Knoxville. School of Law.
For primary bibliographic entry see Field 6F.
W78-02857

SOME RESULTS OF COMPARING THE ECOLOGICAL SCALES OF RAMENSKII, ELLENBERG, HUNDT AND KLAPP, (IN RUSSIAN),
Leningrad State Univ. (USSR). Biological Inst.
For primary bibliographic entry see Field 6G.
W78-02874

AN EXAMPLE OF THE EXPERIMENTAL ANALYSIS OF RUNOFF FACTORS UNDER SIMULATED RAINFALLS, (IN FRENCH),
For primary bibliographic entry see Field 2B.
W78-02898

FLOOD CONTROL SYSTEM FOR A DAM,
Hitachi Ltd. (Japan). (Assignee).
For primary bibliographic entry see Field 8A.
W78-02905

FINGER-FILL CANAL STUDIES, FLORIDA AND NORTH CAROLINA,
Environmental Protection Agency, Athens, GA. Surveillance and Analysis Div.
For primary bibliographic entry see Field 5G.
W78-03079

REMOVAL OF ALGAE IN NATURAL BODIES OF WATER,
California Univ., Berkeley. Coll. of Engineering.
For primary bibliographic entry see Field 5G.
W78-03080

SURFACE-WATER AVAILABILITY, CALHOUN COUNTY, ALABAMA,
Geological Survey, Tuscaloosa, AL. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-03113

SURFACE WATER, BULLOCK COUNTY, ALABAMA,
Geological Survey, Tuscaloosa, AL. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-03114

WATER AVAILABILITY AND GEOLOGY OF HALE COUNTY, ALABAMA,
Geological Survey, Tuscaloosa, AL. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-03115

WATER AVAILABILITY OF RANDOLPH COUNTY, ALABAMA,
Geological Survey, Tuscaloosa, AL. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-03116

WATER AVAILABILITY, ELMORE COUNTY, ALABAMA,
Geological Survey, Tuscaloosa, AL. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-03117

FLOODS IN OHIO--MAGNITUDE AND FREQUENCY,
Geological Survey, Columbus, OH. Water Resources Div.
For primary bibliographic entry see Field 2E.
W78-03120

WATER RESOURCES DATA FOR ALASKA, WATER YEAR 1976.
Geological Survey, Anchorage, AK. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-03122

WATER RESOURCES DATA FOR ARIZONA, WATER YEAR 1976.
Geological Survey, Tucson, AZ. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-03123

TIME OF TRAVEL OF SOLUTES IN THE TUSCARAWAS RIVER BASIN, OHIO, AUGUST AND SEPTEMBER, 1974,
Geological Survey, Columbus, OH. Water Resources Div.
For primary bibliographic entry see Field 5B.
W78-03131

TIME OF TRAVEL OF SOLUTES IN SELECTED REACHES OF THE SANDUSKY RIVER BASIN, OHIO, 1972 AND 1973,
Geological Survey, Columbus, OH. Water Resources Div.
For primary bibliographic entry see Field 5B.
W78-03132

DRAINAGE AREAS OF THE GUYANDOTTE RIVER BASIN, WEST VIRGINIA,
Geological Survey, Charleston, WV. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-03135

APPLICATION OF REMOTELY SENSED LAND-USE INFORMATION TO IMPROVE ESTIMATES OF STREAMFLOW CHARACTERISTICS,
Geological Survey, Reston, VA. Water Resources Div.
E. J. Pluhowski.
Open-file report 77-632, 1977. 85 p, 12 fig, 2 tab, 11 ref.

Descriptors: *Remote sensing, *Aerial photography, *Streamflow, *Land use, *Satellites(Artificial), Delaware, Maryland, Virginia, Evaluation, Regression analysis, Equations, Streamflow, Flow characteristics, Estimating, Landsat imagery.

Land-use data derived from high-altitude photography and satellite imagery are presented for 49 basins in Delaware, and eastern Maryland and Virginia. Based on 1:100,000 scale maps from high-altitude photography, basin land cover was extracted at the generalized Level I and the more detailed Level II classification categories. Level I land-use data summaries were prepared for 46 of the basins using the 1:250,000 scale maps derived from Landsat imagery. Land cover in the basins ranged from 93.9 percent urban at Little Falls Branch near Bethesda, Maryland, to 96.2 percent agricultural at Morgan Creek near Kennedyville, Maryland. Applying multiple regression techniques to a network of gaging stations monitoring runoff from 39 of the basins, it was demonstrated that land-use data from high-altitude photography provides an effective means of significantly improving estimates of streamflow. Forty streamflow-characteristics equations incorporating remotely sensed land-use information, were compared with a control set of equations using map derived land cover. (Woodard-USGS)
W78-03136

POTENTIAL WATER RESOURCES IN THE TURKMEN SSR AND PROSPECTS OF THEIR UTILIZATION, (IN RUSSIAN),
Desert Inst., Ashkhabad (USSR).
B. T. Kirsta.
Probl Osvo Pustyn 6, p 30-35, 1976.

Descriptors: Water utilization, *Water resources development, *Potential water resources, Forests, Pastures, *Rainfall, *USSR(Turkmen SSR).

Potential water resources in Turkmen SSR (USSR) include rainfall floods in ephemeral water courses and short rivers from mountain and hill areas, the runoff on takyrs-like soils in plains. The potential water resources (p.w.r.) are estimated to be 540 million m3 in mountains and nolls and 330 millions m3 in plains. Part of p.w.r. should be used for pasture water supply but most (90%) should be used for takyr reclamation and smooth slopes and mountain valleys afforestation. To use p.w.r. for systematic irrigation is irrational.--Copyright 1978, Biological Abstracts, Inc.
W78-03154

4B. Groundwater Management

UNSTEADY FLOW TO A PUMPED WELL IN A FISSURED WATER-BEARING FORMATION,
Sheffield Univ. (England). Dept. of Civil and Structural Engineering.
For primary bibliographic entry see Field 2F.
W78-02787

UNSTEADY FLOW TO A PUMPED WELL IN A TWO-LAYERED WATER-BEARING FORMATION,
Sheffield Univ. (England). Dept. of Civil and Structural Engineering.
For primary bibliographic entry see Field 2F.
W78-02788

FARMERS INVESTMENT COMPANY V. BETTWY: A JUDICIAL RESTRICTION OF GROUND WATER WITHDRAWALS, COERCING THE ARIZONA LEGISLATURE TO ACT,
For primary bibliographic entry see Field 6E.
W78-02846

EXPANSION OF THE RESERVATION OF WATER RIGHTS DOCTRINE,
Nebraska Univ., Lincoln. School of Law.
For primary bibliographic entry see Field 6E.
W78-02850

THE WATER DEPLETION DEDUCTION IN KANSAS, ITS STATUS AND PROSPECTIVE USE,
For primary bibliographic entry see Field 6E.
W78-02851

SURFACE-WATER AVAILABILITY, CALHOUN COUNTY, ALABAMA,
Geological Survey, Tuscaloosa, AL. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-03113

SURFACE WATER, BULLOCK COUNTY, ALABAMA,
Geological Survey, Tuscaloosa, AL. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-03114

WATER AVAILABILITY AND GEOLOGY OF HALE COUNTY, ALABAMA,
Geological Survey, Tuscaloosa, AL. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-03115

WATER AVAILABILITY OF RANDOLPH COUNTY, ALABAMA,
Geological Survey, Tuscaloosa, AL. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-03116

WATER AVAILABILITY, ELMORE COUNTY, ALABAMA,
Geological Survey, Tuscaloosa, AL. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-03117

AVAILABILITY AND CHEMICAL CHARACTERISTICS OF GROUND WATER IN CENTRAL LA PLATA COUNTY, COLORADO,
Geological Survey, Lakewood, CO. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-03118

AVAILABILITY AND CHEMICAL QUALITY OF GROUND WATER IN THE CRYSTAL RIVER AND CATTLE CREEK DRAINAGE BASINS NEAR GLENWOOD SPRINGS, WEST-CENTRAL COLORADO,
Geological Survey, Lakewood, CO. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-03119

WATER RESOURCES DATA FOR ALASKA, WATER YEAR 1976.
Geological Survey, Anchorage, AK. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-03122

WATER RESOURCES DATA FOR ARIZONA, WATER YEAR 1976.
Geological Survey, Tucson, AZ. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-03123

RISING GROUND-WATER LEVEL IN DOWNTOWN LOUISVILLE, KENTUCKY, 1972-1977,
Geological Survey, Louisville, KY. Water Resources Div.
J. M. Kernodle, and D. V. Whitesides.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-273 067, Price codes: A03 in paper copy, A01 in microfiche. Water Resources Investigations 77-92, September 1977. 24 p, 9 fig, 27 ref.

Descriptors: *Kentucky, *Groundwater recharge, *Water table, *Potentiometric level, *Foundation failure, Buildings, Saturated soils, Data collections, *Water levels, Observation wells, Forecasting, Evaluation, Louisville area(KY).

Ground-water levels in the alluvial aquifer in Louisville, Jefferson County, Kentucky, are rising at a rate which could cause wet basements and possible structural damage to buildings in the downtown area by 1982. The predicted water level for 1982 is based on the nearly linear increase which has been observed from 1972 to 1977, during which period a rise of as much as 32 feet was recorded in water-level observation wells. Foremost among the possible causes of the rise is a decrease in withdrawal of ground water. (Woodard-USGS)
W78-03124

GROUND-WATER RESOURCES OF DESOTO AND HARDEE COUNTIES, FLORIDA,
Geological Survey, Tallahassee, FL. Water Resources Div.
W. E. Wilson.
Florida Bureau of Geology, Tallahassee, Report of Investigations No 83, 1977. 102 p, 42 fig, 1 plate, 10 tab, 47 ref, append.

Descriptors: *Groundwater resources, *Hydrogeology, *Aquifer characteristics, *Florida, *Water utilization, Irrigation, Citrus fruits, Water supply, Water quality, Water wells, Pumping, Drawdown, Groundwater recharge, Transmissivity, Potentiometric level, *Floridan aquifer, *DeSoto County(Fla), *Hardee County(Fla).

Ground water in DeSoto and Hardee Counties, Florida, is obtained from a surficial aquifer, which is principally fine sand, and the Floridan aquifer, which consists of two limestone-dolostone units. Average transmissivity of the surficial aquifer is 1,300 feet squared per day, and transmissibity of the combined upper and lower units of the Floridan aquifer is as high as 270,000. Seasonally, the potentiometric surface fluctuates as much as 30 ft. From 1949 to 1973, net declined throughout the area ranged from a few feet to 20 ft. Data from a citrus-grove well field with a pumping capacity of 86 million galons per day indicate drawdowns 5 mi from the grove center will be about 5 ft at the end of each spring pumping period. Water levels will recover during summer non-pumping periods. Water from the upper unit of the Floridan aquifer generally has alower mineral concentration than water from the lower unit. In parts of both counties, concentrations of sulfate, chloride and fluoride exceed limits recommended for drinking water. Ground-water withdrawals averaged 94 million gallons per day in 1970: about 96 percent was for irrigation purposes. Several water-management techniques are hydrologically feasible. (Woodard-USGS)
W78-03125

HYDROLOGIC MONITORING OF A WASTE-INJECTION WELL NEAR MILTON, FLORIDA, JUNE 1975 - DECEMBER 1976,
Geological Survey, Tallahassee, FL. Water Resources Div.
For primary bibliographic entry see Field 5B.
W78-03126

PRELIMINARY STUDY OF SOURCES AND PROCESSES OF ENRICHMENT OF MANGANESE IN WATER FROM UNIVERSITY OF RHODE ISLAND SUPPLY WELLS,
Geological Survey, Boston, MA. Water Resources Div.; and Geological Survey, Providence, RI. Water Resources Div.
For primary bibliographic entry see Field 5B.
W78-03127

GEOLOGY AND GROUND WATER IN WESTERN SANTA CRUZ COUNTY, CALIFORNIA, WITH PARTICULAR EMPHASIS ON THE SANTA MARGARITA SANDSTONE,
Geological Survey, Menlo Park, CA. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-03129

GROUND-WATER HYDROLOGY OF THE LOWER MILLIKEN-SARCO-TULUCAY CREEKS AREA, NAPA COUNTY, CALIFORNIA,
Geological Survey, Menlo Park, CA. Water Resources Div.
For primary bibliographic entry see Field 2F.
W78-03133

4C. Effects On Water Of Man's Non-Water Activities

TRANSMISSION LINE RIGHTS-OF-WAY MANAGEMENT,
Mississippi State Univ., Mississippi State. Dept. of Wildlife and Fisheries.
For primary bibliographic entry see Field 6B.
W78-02730

HYDROLOGIC AND METEOROLOGICAL ROLE OF FOREST PLANTATIONS OF VARIOUS TREE SPECIES,
Vsesoyuznyi Nauchno-Issledovatelskii Inst. Lesovodstva i Mekhanizatsii Lesnogo Khozyaistva, Pushkino (USSR).
N. A. Voronkov, S. A. Kozhevnikova, L. T. Pavlushkin, and V. A. Shompolova.
Soviet Hydrology, Selected Papers, Vol. 15, No. 1, p 75-79, 1976. 3 fig, 5 tab, 9 ref. Translated from Forestry (Lesovedeniye), No. 1, p 3-10, 1976.

Descriptors: *Forests, *Runoff, *Forest watersheds, Meteorological data, Hydrologic data, Forestry, Temperature, Air temperature, Evaporation, Humidity, Precipitation(Atmospheric), Rainfall, Snowfall, Hydrographs, Microclimatology, Trees, Vegetation, Vegetation effects, *USSR.

The results of a study of the microclimate and water regime of deciduous, mixed, and pure spruce plantations at the Istra base station of the All-Union Scientific Research Institute of Silviculture and Forestry Mechanization were generalized. A comparative description was given of the air and soil temperature regimes, precipitation interception by the tree crowns, soil freezing, soil moisture, penetration of solar radiation through the crowns, and other meteorological elements. Surface runoff characteristics in basins wooded to different degrees were analyzed. The influence of various tree species on moisture accumulation under the plantations was estimated. (Sims-ISWS)
W78-02806

SEASONAL VARIATIONS IN THE IMPACT OF SUBURBAN DEVELOPMENT OF RUNOFF RESPONSE: PETERBOROUGH, ONTARIO,
Trent Univ., Peterborough (Ontario). Dept. of Geography.
D. H. Taylor.
Water Resources Research, Vol. 13, No. 2, p. 464-468, 1977. 1 fig, 1 tab, 11 ref.

Descriptors: *Urban runoff, *Suburban areas, Runoff, *Canada, Snowmelt, Storm runoff, Agricultural runoff, Drainage, Drains, Drainage water, *Rural runoff, Peterborough(Canada).

Rural and suburban runoff in a small basin in Peterborough, Ont., Canada were compared in summer, fall and spring. The study basin, in Kawartha Heights on Peterborough's western periphery, has a mean annual precipitation of 780 mm spread fairly evenly over the year, and is underlain by unconsolidated sandy till. Spring snowmelt usually provides peak runoff flow. The upper rural sector (1.14 sq km) is pasture, woodland, and scrub. In the lower urban sector (0.70 sq km), 38% of the surface was impervious to infiltration (due to paving and buildings) during the study period of all 1973 and spring and summer 1974. An underground storm sewer network plus open ditches drain the urban area. A strong seasonal variation in the runoff-rainfall ration was observed in the urban area, but not in the rural sector. The ratio for urban runoff ranged from 0.06 for summer to 0.16 for fall and 0.76 for spring, compared to 0.05, 0.07 and 0.06 for rural runoff. Urban direct runoff volumes exceeded rural volumes by factors of 1.23 for summer rainstorms, 2.28 for fall rainstorms, and 7.49 for spring snowmelt and rain on snow. Urban peak discharges exceeded rural peaks for the same seasons by ratio of 4.46, 2.42 and 7.10. These seasonal variations in urban runoff-rainfall ratios contradict the usual assumption that urban runoff is controlled in a consistent way by the impervious surface and drain network. (Lynch-Wisconsin)
W78-03062

AERIAL INPUT OF HEAVY METALS INTO AN AQUATIC ECOSYSTEM,
Greenfield, Attaway and Tyler, Inc., San Rafael, CA.
For primary bibliographic entry see Field 5B.
W78-03074

HYDRAULIC ANALYSIS, MAD RIVER AT STATE HIGHWAY 41, SPRINGFIELD, OHIO,
Geological Survey, Columbus, OH. Water Resources Div.
R. I. Mayo.
Open-file report 77-399, 1977. 25 p, 12 fig, 5 tab, 3 ref.

Descriptors: *Hydrologic data, *Floods, *Flood plains, *Highway effects, *Bridges, Ohio, Flood discharge, Flood profiles, Backwater, Storm drains, *Mad River basin, Springfield(Ohio).

A hydraulic analysis of the Mad River in a reach at Springfield, Ohio, was made to determine the effects of relocating State Highway 41. The main channel was cleaned by dredging in the vicinity of the new highway bridge and at the Detroit, Toledo and Ironton Railway bridge upstream. The new highway was placed on a high fill with relief structures for flood plain drainage consisting of a 12-foot corrugated metal pipe culvert and a bridge opening to accommodate the Detroit, Toledo and Ironton Railway and a property access road. The improvement in the capacity of the main channel to carry water was such that, up to a discharge equivalent to a 25-year frequency flood, the water-surface elevation in the reach upstream from the Detroit, Toledo and Ironton Railway bridge would be about 0.6 foot lower than under conditions prior to the construction on State Highway 41. The maximum difference in elevation of the flood water between the upstream and downstream side of the new State Highway 41 embankment would be about 0.2 foot, with an additional 0.2 foot to be expected if the access road were raised 1.5 feet. (Woodard-USGS)
W78-03134

4D. Watershed Protection

GUIDELINES FOR MONITORING AND REPORTING DEMONSTRATION PROJECTS; SECTION 32 PROGRAM, STREAMBANK EROSION CONTROL EVALUATION AND DEMONSTRATION ACT OF 1974,
Army Engineer Waterways Experiment Station, Vicksburg, MS.
E. B. Pickett, and B. J. Brown.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A046 397, Price codes: A04 in paper copy, A01 in microfiche. Instruction Report H-77-1, September 1977. 52 p, 9 fig, 9 photo, 15 pl.

Descriptors: *Bank protection, *Erosion control, Monitoring, Projects, Evaluation.

These guidelines are to aid in providing brief, thorough, uniform documentation of the data to be collected by field monitoring and reported for the numerous demonstration projects to be conducted under the Streambank Erosion Control Evaluation and Demonstration Act of 1974 (Section 32 of Public Law 93-251). (WES)
W78-02754

DETAILED DESIGN FOR DYKE MARSH DEMONSTRATION AREA, POTOMAC RIVER, VIRGINIA,
Army Engineer Waterways Experiment Station, Vicksburg, MS.
For primary bibliographic entry see Field 8B.
W78-02765

LITERATURE SURVEY AND PRELIMINARY EVALUATION OF STREAMBANK PROTECTION METHODS,
Army Engineer Waterways Experiment Station, Vicksburg, MS.
For primary bibliographic entry see Field 2J.
W78-02776

HYDROLOGIC AND METEOROLOGICAL ROLE OF FOREST PLANTATIONS OF VARIOUS TREE SPECIES,
Vsesoyuznyi Nauchno-Issledovatelskii Inst. Lesovodstva i Mekhanizatsii Lesnogo Khozyaistva, Pushkino (USSR).
For primary bibliographic entry see Field 4C.
W78-02806

BUILDING A BETTER SMALL WATERSHED PROGRAM,
Journal of Soil and Water Conservation, Vol 32, No 4, p 150-57, July 1977.

Descriptors: *Small watersheds, *Water policy, *Project purposes, *Watersheds(Basins), *Watershed managment, Soil conservation, Water conservation, Cost sharing, Treatment, Federal project policy, Project post-evaluation, Agriculture, Project planning, Operation and maintenance, Developed waters, Environmental control, Legislation, Programs, Public benefits, State governments, Local governments.

Early in 1977 the National Watershed Congress asked a special study commission to determine how America's small water watershed program could be improved. The commission stressed that the overall small watershed program is a valuable and important one. It also overwhelmingly endorsed the development of a national water policy. This report sets out those findings as well as the commission's recommendations. Eight areas of concern are covered in the report: program orientation, additional authorities for cost-sharing, public participation, watershed planning, state and local responsibilies, land treatment, federal funding policies, and post-project evaluations. The commission suggests an orientation shift from strictly econmic development to 'quality of life' considerations. There should also be increased local, state and public participation and responsibility in small watershed program planning, development, operation and maintenance. Other recommendations include streamlining program procedures, expansion of post-project evaluations, and federal funding of new planning starts. The report is also interspersed with comments the commission has received from interested parties and knowledgeable sources in the fields of natural resource conservation, environmental protection and agriculture. (Spector-Florida)
W78-02876

ANALYSIS OF RUNOFF FROM SMALL DRAINAGE BASINS IN WYOMING,
Geological Survey, Cheyenne, WY. Water Resources Div.
For primary bibliographic entry see Field 2E.
W78-03137

EFFECT OF ROOT SYSTEMS AND SOIL DENSITY ON ANTIEROSION STABILITY, (IN RUSSIAN),
Moscow State Univ. (USSR). Dept. of Physics; and Moscow State Univ. (USSR). Dept. of Melioration.
M. S. Kuznetsov.
Vestn Mosk Univ Ser Vi Biol Pochvoved 31(6), p 100-108, 1976.

Descriptors: Root systems, Soil density, Erosion control, Soil stability, *Scouring velocity(Soils).

The influence of small roots and soil density on the value of bottom scouring velocity was studied. Empirical factors that reflect influence of these agents allows use of calculation scouring velocities more precisely.--Copyright 1978, Biological Abstracts, Inc.
W78-03157

5. WATER QUALITY MANAGEMENT AND PROTECTION

5A. Identification Of Pollutants

TOXICITY EVALUATION OF A COMPLEX METAL MIXTURE TO THE SOFTSHELL CLAM MYA ARENARIA,
Environmental Research Lab., Narragansett, RI.
For primary bibliographic entry see Field 5C.
W78-02703

THE RAPID ALGAE TEST - A CONTRIBUTION TO THE MEASUREMENT OF TOXICITY (DER ALGENSCHNELL TEST - EIN BEITRAG ZUR TOXIZITATMESSUNG),
Landesanstalt fuer Wasser und Abfall Nordrhein-Westfalen, Duesseldorf (West Germany).
G. Freidrich.
Gewasser und Abwasser, No 57/58, 1975. p 117-120. 1 fig, 5 ref.

Descriptors: *Pollutant identification, *Methodology, *Bioassay, Laboratory tests, Analytical techniques, Toxicity, Wastes, Water quality, Oxygen, Oxygen demand, Primary productivity, *Algae, Phytoplanktobn, *Algal poisoning, Plant growth, Plant physiology.

A rapid test for toxicity using algae is described. Changes in the oxygen production and oxygen consumption of an algae culture are used as indicators of the acute toxicity potential of dissolved toxic substances. (Katz)
W78-02714

TOXICITY TOLERANCE STUDIES UTILIZING PERIPHYTON (TOXITOLERANZVERUCHE AN WASSERMOOSEN),
Duisburg Univ. (West Germany). Dept. of Biology.
For primary bibliographic entry see Field 5C.
W78-02715

POLLUTION OF THE BALTIC BY CRUDE OIL PRODUCTS (ZANLECZYSZCZENIE BALTYKU SUBSTANCJAMI ROPOPOCHODNYMI),
E. Rakowska, and E. Lysiak.
Prace Morskiego Instytutu Rybackiego, Vol 18, Series A, 1976, p 49-62, 8 tab, 5 fig, 15 ref.

Descriptors: *Pollutant identification, *Oil, *Oil pollution, On-site-investigations, *Water quality, Water pollution effects, Methodology, *Analytical techniques, Laboratory tests, *Spectrophotometry, Oil spills, Surface waters, *Baltic Sea, *Crude oil, Carbon tetrachloride extractabls, *Polar fractions, *Non-polar fractions.

The method of infrared spectrophotometry was applied to determine small amounts of crude oil products polluting sea water. The pollutants extractable with carbon tetrachloride were separated into two fractions, the non-polar regarded as a real oil pollution, and the polar one containing such compounds as glycerides, alcohols, acids, etc. The distribution of oil in the Baltic in 1973 and 1974 was examined with the accuracy of 0.050 mg/l. The concentrations of carbon tetrachloride extractable material ranged from 0.100 to 0.200 mg/l, mainly, and 70% of these values was the non-polar fraction - oil derived hydrocarbons. (Katz)
W78-02716

THE POLLUTION OF THE RHINE ZOOCENOSIS BY MERCURY AND BY ORGANOCHLORINE COMPOUNDS (LA POLLUTION DE LA ZOOCENOSE RHENANE PAR LE MERCURE ET LES PRODUITS ORGANOCHLORES),
Institut de Botanique, Strasbourg (France). Lab. de Ecologie Vegetale.
C. Kempf, and B. Sittler.
La Terre et la Vie, Vol 31, No 4, October 1977, p 661-668. 3 tab, 2 fig, 8 ref. (English Summary).

Descriptors: *Metals, *Mercury, *Fishkills, *Chlorinated hydrocarbon pesticides, DDE, *Polychlorinated biphenyls, Arochlor, *DDT, Minnows, Perches, Wildlife, Birds, Yellow perch, Gulls, *Rhine River, Rutilus, Leuciscus, Perca, Larus, Sterna, Grebes, Podiceps, *Herons, *Hawks, *Swallow, Bird eggs.

After a mass mortality of fish in river Rhine, determinations of various toxichemicals (Mercury and organochlorine compounds) were made in five species of fish and in the eggs of six species of birds. The high concentrations of these pollutants found both in fish and birds quite probably explain their increased mortality rate during the period 1973-1975; it might also be responsible for some abnormal behaviour patterns recently noticed among gulls. (Katz)
W78-02718

INTERCALIBRATION OF GAS CHROMATOGRAPHIC ANALYSES FOR HYDROCARBONS IN TISSUES AND EXTRACTS OF MARINE ORGANISMS,
Woods Hole Oceanographic Institution, MA.
J. W. Farrington, J. W. Teal, G. C. Medeiros, K. A. Burns, and E. A. Robinson, Jr.
Available from the National Technical Information Service, Springfield, VA 22161 as ADA-032 949, Price codes: A02 in paper copy, A01 in microfiche. Technical Report No. WHO 1-76-107, IDOE 76-310, November 1976, 6 p. Reprinted from Analytical Chemistry, Vol. 48, Oct. 1976, p 1711-1716. 5 tab, 9 ref.

Descriptors: *Pollutant identification, *Methodology, *Laboratory tests, Lipids, Laboratory methods, Chemical analysis, *Oil, *Oil pollution, *Laboratories, Biochemistry, Water pollution effects, Path of pollutants, *Instrumentation, *Calibrations, Chromatography, *Gas chromatography, *Hydrocarbons, Intercalibration, Tuna meal, Cod liver lipids, *Petroleum hydrocarbons, *South Louisiana crude, *No. 2 Fuel oil, *Wilmington crude oil, *Pristane.

Gas chromatographic analyses of hydrocarbons separated from tuna meal samples and cod liver lipid extracts have been intercalibrated among three laboratories. Measurement of petroleum hydrocarbons spiked to samples of cod liver oil gave values as follows: distillate cut of South Louisiana crude oil--372 microg/g, 0.09, 0.06; No. 2 fuel oil--1163 microg/g, 0.50, 0.26; Wilmington crude oil--913 microg/g, 0.69, 0.34. The estimates of petroleum hydrocarbons in tuna meal subsamples gave an average of 37.7 plus or minus 4.6 microg/g dry weight. Measurements of pristane in cod liver lipid samples gave an average of 35.7 plus or minus 3.5 microg/g lipid and 271 plus or minus 4.5 microg/g lipid. Measurements of pristane in tuna meal were less precise with an average of 2.4 plus or minus 1.5 microg/g dry weight. Some limitations to current methods of analysis as applied in this study and in several current oil pollution studies are demonstrated and discussed. (Katz)
W78-02729

GROWTH OF ROCK BASS, AMBLOPLITES RUPESTRIS, IN RELATION TO THE MORPHOEDAPHIC INDEX AS AN INDICATOR OF AN ENVIRONMENTAL STRESS,
Toronto Univ. (Ontario). Dept. of Zoology.
P. M. Ryan, and H. H. Harvey.
Journal of the Fishery Research Board of Canada, Vol. 34, 1977, p 2079-2088. 4 tab, 6 fig, 27 ref.

Descriptors: *Bioindicators, *Air pollution, *Air pollution effects, Environmental effects, *Stress, Lakes, *Acidic water, Acids, Bass, Freshwater fish, *Fish populations, Growth rates, Hydrogen concentration, *Rock bass, *Ambloplites, *Morphoedaphic index, Environmental stress, *Lake acidification, Fish growth rate, Population density.

Atmospheric contamination by sulfur dioxide in the Sudbury region and the associated acidification has reduced population densities of fishes in the La Cloche Mountain lakes, 33-90 km away Surviving rock bass (Ambloplites rupestris) responded to decreased abundance with increased growth rate. Variation in abundance among surviving populations could be monitored by means of individual growth rates and mean lake depth. Our findings suggest that growth rate of fishes, in conjunction with the morphoedaphic index, may serve as an indicator of environmental stress. (Katz)
W78-02736

ISOLATION OF TRICHODERMA HARZIANUM (RIFAI) GROWING ON FERRIC HYDROXIDE MUD IMPREGNATED WITH GAS OIL,
Societe Francais des Petroles BP, Paris. Div. of Microbiology.
C. Gudin, and K. W. A. Chater.
Environmental Pollution, Vol. 14, 1977, p 1-4. 5 ref.

Descriptors: *Fungi, *Oil, *Oil pollution, *Biodegradation, Bioassay, Biological treatment, Microbiology, Water pollution, Water pollution effects, Waste disposal, *Fuel oil, Gas-oil, *Ferric hydroxide mud, Fungal growth, *Trichoderma harzianum, Oil contaminated water, Fungal growth.

In northern France, gas oil-impregnated ferric hydroxide mud was found to support fungal growth. The fungus was identified by the Commonwealth Mycological Institute, Kew, with whom a reference culture has been registered. Experiments indicated that its growth resulted from the biodegradation of the gas oil. It is believed that, in this unusual situation, contaminating hydrocarbons may be removed from the environment by microbial activity. (Katz)
W78-02738

THE EFFECTS OF THE WATER-SOLUBLE FRACTIONS OF NO. 2 FUEL OIL ON THE EARLY DEVELOPMENT OF THE ESTUARINE FISH, FUNDULUS GRANDIS BAIRD AND GIRARD,
Texas A and M Univ., College Station. Dept. of Biology.
For primary bibliographic entry see Field 5C.
W78-02739

ECOLOGICAL AND DISEASE STUDIES OF DEMERSAL FISHES IN PUGET SOUND NEAR METRO-OPERATED SEWAGE TREATMENT PLANTS AND IN THE DUWAMISH RIVER,
Washington Univ., Seattle. Fisheries Research Inst.
B. S. Miller, B. B. McCain, R. C. Wingert, S. F. Borton, and K. V. Pierce.
Puget Sound Interim Studies, Municipality of Metropolitan Seattle, Final Report No. CR2231, 1977. 164 p, 39 fig, 39 tab, 216 ref.

Descriptors: *Demersal fish, *Marine fish, *Distribution, *Effluents, *Municipal wastes, *Sampling, *Fish diseases, Ecosystems, Rivers, Water quality, Water pollution sources, Fish parasites, Biological communities, Baseline studies, Speciation, Population, Washington, *Duwamish River(Wash), *Puget Sound(Wash), *Flatfish, Tissue analysis, Bottom fish.

The effects of sewage effluent on demersal fish community structure and the relationship between sewage outfalls and disease incidence and parasite infestation levels were investigated. Baseline data for future sewage treatment procedures analysis on demersal fish was collected. A sampling program was designed to collect data on species composition, distribution, and abundance as well as disease and parasite incidences in the vicinity of two sewage outfalls and a control site. The Duwamish River study provided data on the spatial and temporal distribution of tumor-bearing and parasitized flatfishes- in particular starry flounder. Additional data were gathered on the distribution and abundance of all non-flatfish species. (Klein)
W78-02741

A SELECTED BIBLIOGRAPHY ON RAINBOW TROUT, SALMO GAIRDNERI RICHARDSON, WITH PARTICULAR REFERENCE TO STUDIES WITH AQUATIC TOXICANTS,
Environmental Protection Service, Halifax (Nova Scotia). Environmental Services Branch.
For primary bibliographic entry see Field 5C.
W78-02742

TOXICITY OF TNT WASTEWATER (PINK WATER) TO AQUATIC ORGANISMS,
Stanford Research Inst., Menlo Park, CA.
For primary bibliographic entry see Field 5C.
W78-02743

DEVELOPMENT OF AN ON-LINE BIOLOGICAL DETECTOR,
Gulf South Research Inst., New Orleans, LA.
K. Ehrlich, E. Klein, and J. K. Smith.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A034 493, Price codes: A04 in paper copy, A01 in microfiche. Army Medical Research and Development Command, Washington D.C., July 1976. 54 p, 1 tab, 16 fig, 27 ref.

Descriptors: *Public health, *Toxins, Methodology, Laboratory tests, Animal physiology, Laboratory equipment, Oxygen demand, Oxygen requirements, *Water supplies, *Domestic water, *Pollutant identification, *Toxicants, *Recycled water, *Cell culture, Oxygen utilization, Glucose utilization, Lactic acid excretion rate.

Mammalian cells are being grown in artificial capillary perfusion culture in an effort to develop a sensor for toxic components in recycled water intended for human consumption. Cultures of BHK or L929 cells can be established in capillary culture in one week or less by planting the units with a high seed population. Culture using either 1% or 10% calf-serum-containing medium allows the cells to reach a plateau in growth. Cultures can be maintained in either a once-through perfusion mode or a recirculation perfusion mode for prolonged periods at rates slow enough to allow rapid measurement of oxygen and glucose utilization and lactic acid excretion rate provided that (1) the flow rate is slow enough and (2) the toxin is in direct contact with the cells. (Katz)
W78-02746

THE TOXICITY OF URANIUM AND PLUTONIUM TO THE DEVELOPING EMBRYOS OF FISH,
Oak Ridge National Lab.
For primary bibliographic entry see Field 5C.
W78-02747

NATIONAL SURVEY OF PESTICIDES IN DRINKING WATER,
Stanford Research Inst., Menlo Park, CA.
E. M. McCarthy.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-259 659, Price codes: A07 in paper copy, A01 in microfiche. Office of Water Supply. Environmental Protection Agency, Wash., D.C. Final Report No. PYU-4070, June 1976. 145 p, 3 tab, 91 fig.

Descriptors: Potable water, *Pollutant identification, *Public health, *Water supply, *Aldrin, *Dieldrin, *DDT, *Heptachlor, Analytical methods, Laboratory tests, *Chlorinated hydrocarbon pesticides, Monitoring, Gas chromatography, Spectroscopy, *Heptachlor epoxide, *Chlordane, Mass chromatography, Mass spectral analysis, *Anthracene, *Atrazine, Phthalate, *Chloronaphthalene, *Triphenyl phosphate.

More than 700 samples of raw and finished drinking water were analyzed for the presence of aldrin, dieldrin, DDT, and DDT metabolites. Thirty samples were also analyzed for the presence of heptachlor, heptachlor epoxide and chlordane. At the levels of detection, 107 water samples were found to contain dieldrin, 4 contained aldrin and dieldrin, 6 contained dieldrin and DDT, and 2 contained DDT. No samples were found to contain heptachlor, heptachlor epoxide or chlordane at or above the minimum levels of detection. (Katz)
W78-02750

MICROBIAL METABOLISM OF POLYCHLORINATED BIPHENYLS. STUDIES ON THE RELATIVE DEGRADABILITY OF POLYCHLORINATED BIPHENYL COMPONENTS BY ALKALIGENES SP.,
Wisconsin Univ.-Madison. Dept. of Entomology.
For primary bibliographic entry see Field 5C.
W78-02752

PESTICIDE RECOVERY STUDIES FOR EVALUATION OF PEST MANAGEMENT AND PESTICIDE MONITORING DIVISION WATER ANALYSIS METHODOLOGY, JUNE 1974-JUNE 1976,
Army Environmental Hygiene Agency, Aberdeen Proving Ground, MD.
J. H. Vinopal, and J. F. Suprock.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A030 003, Price codes: A02 in paper copy, A01 in microfiche. Army Environmental Hygiene Agency, Aberdeen Proving Ground, MD, Entomological Special Study No 44-038-74/76, 1976, 18 p. 10 tab.

Descriptors: *Methodology, *Pesticides, Monitoring, *Laboratory tests, Water quality, Path of pollutants, *Analytical techniques, Insecticides, *DDD, Chlorinated hydrocarbon pesticides, *DDT, *DDE, *Dieldrin, *Heptachlor, Instrumentation, *BHC, Chloropyrifos, *Heptachlor epoxide, *Lindane, *Mirex, *Parathion, Recovery studies, *Instrumental sensitivity, Automatic integration.

This final report describes percent recovery studies carried out using 10 representative pesticides for the validation of the environmental surface water analysis method used in the Department of the Army Pesticide Monitoring Program. In addition, this report presents lower limits on nstrumental sensitivity for the 26 pesticides of the DA Pesticide Monitoring Program routine monitoring list. Thirdly, this report presents data comparing automatic integration (Auto Lab System IV Computing Integrator) and manual (peak height measurement) quantitation techniques. (Katz)
W78-02753

PRELIMINARY EVALUATION OF WATER QUALITY OF PROPOSED FOUNTAIN LAKE, COLORADO.
Army Engineers Waterways Experiment Station, Vicksburg, MS.
R. W. Hall, and D. L. Robey.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A043 434, Price codes: A04 in paper copy, A01 in microfiche. Miscellaneous Paper Y-77-4, July 1977. 61 p, 1 fig, 13 tab, 1 append, 17 ref.

Descriptors: *Reservoirs, *Water analysis, *Water quality, Colorado, Measurement, Pre-impoundment, Evaluation, Data collections, Nutrients, Bioassay, Pollutant identification, *Fountain Lake(Colo).

The proposed Fountain Lake would be formed by impoundment of Fountain Creek in southwestern Colorado immediately north of Pueblo. Authorized project purposes are flood control, fish and wildlife enhancement, and recreation. The purpose of the present study was to investigate possible water-quality problems that might occur in the proposed impoundment and evaluate the suitability of the project for general recreational and fish and wildlife purposes. The procedures used in this study included an evaluation of existing data and pervious studies on Fountain Creek and adjacent reservoirs, collection and evaluation of additional field data, determination of available and limiting nutrients through algal bioassays, and comparison of measured or predicted results with existing or proposed water-quality criteria. (WES)
W78-02755

SUMMARY REPORT, ARCADIA LAKE WATER-QUALITY REPORT STUDY,
Army Engineer Waterways Experiment Station, Vicksburg, MS.
R. W. Hall, R. L. Eley, and D. L. Robey.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A043 722, Price codes: A03 in paper copy, A01 in microfiche. Miscellaneous Paper Y-77-3, July 1977. 27 p.

Descriptors: *Water quality standards, *Mathematical models, *Nutrients, Oklahoma, Bioassay, Pollutant identification, Water pollution sources, Lakes, *Arcadia Lake(Okla).

The water quality of the proposed Arcadia Lake, Oklahoma, was evaluated relative to water-quality criteria and standards appropriate for the project purposes. Study procedures included evaluation of existing data and previous studies of streams and lakes in the project area; collection and evaluation of additional field data; determination of available and limiting nutrients through algal bioassays; establishment of relationships between stream discharges and loadings of nutrients, metals, and pesticides based on stream concentrations and land-use patterns; application of various mathematical models; and comparison of predicted or measured results with existing or proposed water-quality criteria. A comparison of average values for 70 water-quality parameters with the most stringent standard or criterion revealed that ammonia, manganese, mercury, DDT, dieldrin, aldrin, chlordane, lindane, heptachlor, PCB, phenols, and recal coliforms equaled or exceeded permissible or recommended levels at least part of the time. Only coliform bacteria, ammonia, and manganese exceeded present Oklahoma standards applicable to proposed reservoir uses. Ammonia would not be expected to reach toxic concentrations in the hypolimnion of Arcadia Lake or interfere with project purposes. (WES)
W78-02756

WATER-QUALITY EVALUATION OF A LOWER POOL ELEVATION FOR PROPOSED ARCADIA LAKE, OKLAHOMA,
Army Engineer Waterways Experiment Station, Vicksburg, MS.
K. W. Thornton, D. E. Ford, R. W. Hall, Rex Eley, and D. L. Robey.
Available from the National Technical Information Service, Springfield, VA 22161 as ADA-040 003, Price codes: A04 in paper copy, A01 in microfiche. Technical Report Y-77-3, May 1977. 49 p, 28 fig, 1 tab, 5 ref.

Descriptors: *Water quality, *Reservoirs, Mathematical models, Oklahoma, Evaluation, Lakes, Arcadia Lake(Okla).

This study evaluated the water quality of the proposed Arcadia Lake at the lower pool elevation, 305 m msl, and supplemented the principal report, 'Arcadia Lake Water-Quality Evaluation,' conducted at pool elevation 311 m msl. The water quality of the proposed Arcadia Lake at the lower pool elevation was investigated using a version of the reservoir portion of the Water Quality for River-Reservoir Systems (WQRRS) ecological model. Although other water-quality constituents were simulated, the study concentrated on temperature, dissolved oxygen, algae, and coliform bacteria concentrations. Chemical and biological model coefficients and meteorological, stream-flow, physical, chemical, and biological model updates for study years 1970 and 1973 were identical to those used in the principal study. (WES)
W78-02780

FORECAST OF THE CHANGE IN THE HYDROLOGIC BUDGET, LEVEL, AND MINERAL CONTENT OF LAKE BALKHASH IN THE NEXT TEN YEARS,
For primary bibliographic entry see Field 2H.
W78-02805

A TITRATION APPARATUS FOR THE DETERMINATION OF DISSOLVED OXYGEN IN SEA-WATER,
Bedford Inst. of Oceanography, Dartmouth (Nova Scotia). Atlantic Oceanographic Lab.
E. M. Levy, C. C. Cunningham, C. D. W. Conrad, and J. D. Moffatt.
Journal of the Fisheries Research Board of Canada, Vol 34, No 11, p 2218-2220, November 1977. 1 fig, 2 ref.

Descriptors: *Dissolved oxygen, *Analytical techniques, *Water analysis, *Sea water, *Instrumentation, Oxygen, Water properties, Analysis, Chemistry, Chemical analysis, Testing, Testing procedures, Volumetric analysis, Oceanography, *Oxygen measurements.

A novel titration apparatus for the Carritt/Carpenter modification of the Winkler method for determining dissolved oxygen in seawater was described. Routine quantitative analyses for oxygen are made more reliable and more convenient by reducing the human factor. (Henley-ISWS)
W78-02815

LEACHATE TESTING TECHNIQUES SURVEYED,
Mitre Corp., McLean, VA. METREK Div.
W. Lowenbach, F. Ellerbusch, and J. A. King.
Water and Sewage Works, p 36-46, December 1977. 1 fig, 5 tab, 12 ref. EPA 68-02-1859.

Descriptors: *Leachate, *Landfills, *Waste disposal, *Pollutants, *Environmental sanitation, Infiltration, Leaching, Percolation, Runoff, Solubility, Solid wastes, Water quality, Water chemistry, Water properties, Model studies, Testing procedures, *Leachate testing, *Environmental assessment, Leachate transport.

A summary was presented of the laboratory and field techniques applicable to the assessment of leachate from solid waste disposal landfills. The impact on the ground surface water quality resulting from the leachate was discussed. (Henley-ISWS)
W78-02816

RESEARCH PROGRAM ON HAZARD PRIORITY RANKING OF MANUFACTURED CHEMICALS, PHASE II (CHEMICALS 1-20),
Stanford Research Inst., Menlo Park, CA.
S. L. Brown, F. Y. Chan, J. L. Jones, D. H. Liu, and K. E. McCaleb.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-263 161, Price codes: A09 in paper copy, A01 in microfiche. Final Report, April 1975. 192 p, 20 fig, 20 tab, 23 ref. Report NSF-RA-E-75-190A. ECU-3386.

Descriptors: *Chemical analysis, *Chemical industry, *Chemicals, *Chemical wastes, *Chemical properties, Toxicity, Environmental effects, Hazards, Public health, Data collections, Industrial wastes, Pharmacology, Manufactured chemicals, Contaminants.

In Phase II of a two-phase effort, 80 chemicals having the greatest potential for environmental effects were studied. In this volume, chemicals 1-20 are discussed. Information was collected on the extent of the exposure of the environment to these chemicals (during manufacture and use) and on the possible environmental effects of this exposure (chemical, physical, and biological properties, persistence, and toxicity). A questionnaire survey of industry was conducted to determine the amount and types of losses in the manufacturing plants, and information from this survey is tabulated. Summary reports are given for each chemical, including a flow diagram showing industrial data on the amounts used for various applications, a one page assessment of the data gathered on toxicology and environmental persistence, a computer printout of a tabular summary of the important data gathered, and copies of the 25 most pertinent abstracts found in the area of toxicology. (Wares-IPA)
W78-02877

RESEARCH PROGRAM ON HAZARD PRIORITY RANKING OF MANUFACTURED CHEMICALS. PHASE II. (CHEMICAL 61-79),
Stanford Research Inst., Menlo Park, CA.
For primary bibliographic entry see Field 5B.
W78-02878

AN AUTOMATED GAS CHROMATOGRAPHIC SYSTEM FOR PESTICIDE RESIDUE ANALYSIS,
Environmental Protection Agency, Chicago, IL. Central Regional Lab.
J. H. Johnson, E. E. Sturino, and S. Bourne.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-263 690, Price codes: A02 in paper copy, A01 in microfiche. Report EPA-905/4-77-001, January 1977. 9 p, 1 tab, 22 ref.

Descriptors: *Gas chromatography, *Pesticide residues, *Automation, *Analytical techniques, Chemical analysis, *Pollutant identification, Monitoring, *Phthalates.

Gas chromatograms of pesticides and phthalate esters obtained by an automatic injection system are analyzed by a computerized gas chromatographic data system. The system provides for simultaneous injection onto two independent columns equipped with individual detectors. The gas chromatographic output is processed by the computer into a report for each column, listing the names and concentrations for compounds of interest. The system has sufficient reliability to allow detection of chlorinated pesticides at the picogram level and organophosphorus pesticides and phthalates at the nanogram level. This system can be readily incorporated into currently accepted methods for pesticide residue analysis, and once the system is calibrated, 42 samples can be analyzed for 45 parameters without operator intervention. Use of the semi-automatic pesticide analysis system will enable more effective use of available manpower in water monitoring programs. The system has been employed successfully to analyze drinking waters, surface waters, waste waters, biological (fish) extractions and sediment extractions. (Wares-IPA)
W78-02880

WATER QUALITY INSTRUCTIONAL RESOURCES INFORMATION SYSTEM. VOLUME I. USERS MANUAL.
National Training and Operational Technology Center, Cincinnati, OH.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-262 224, Price codes: A05 in paper copy, A01 in microfiche. Report No. EPA-430/1-76-011, September 1976. (Volume I of 4 volumes.) 89 p, 36 fig, 4 tab.

Descriptors: *Abstracts, Documentation, Bibliographies, Publications, Classifications, Data collections, Data processing, Data storage and retrieval, Information exchange, Information retrieval, Thesauri, Training, Education, *Indexing, Books, Cataloging, Information systems, Subject indexing, Technical reports, Water Quality Instructional Resources Information System(IRIS).

A users manual to assist in learning the basic philosphy and procedures used in the Water Quality Instructional Resources Information System (IRIS) is presented. IRIS contains approximately 2,000 references to materials available for use in education and training programs related to water quality, cataloged with library reference information and classification according to training applications. Materials can be selected based on subject area, educational level, type of training, and type of material, with each entry containing an abstract, source, and cost. The user manual gives instructions for defining IRIS; obtaining a complete reference for any IRIS item; obtaining references given combinations of relevent information, e.g., author's name and date; entering a reference into IRIS; determining whether an instructional resource is in IRIS similar to a proposed instructional material development project; filling out a selective bibliography search request form; naming the computer hardware required to service the system; and naming the software packages required to implement IRIS. (See also W78-02883 thru W78-02885) (Wares-IPA)
W78-02882

WATER QUALITY INSTRUCTIONAL RESOURCES INFORMATION SYSTEM. VOLUME II. IRIS TABLES. THESAURUS, SOURCE CODE TABLE AND SOURCE NAME TABLE.
National Training and Operational Technology Center, Cincinnati, OH.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-262 225, Price codes: A05 in paper copy, A01 in microfiche. Report No. EPA-430/1-76-012, September 1976. Volume II of 4 volumes. 88 p, 2 tab.

Descriptors: *Abstracts, Documentation, Bibliographies, Publications, Classifications, Data collections, Data processing, Data storage and retrieval, Information retrieval, Thesauri, Training, Education, *Indexing, Books, Cataloging, Information systems, Subject indexing, Technical reports, Water Quality Instructional Resources Information System(IRIS).

The thesaurus, source code table, and source name table for users of the Water Quality Instructional Resources Information System (IRIS) are presented. IRIS contains approximately 2,000 references to materials available for use in education and training programs related to water quality, cataloged with library reference information and classification according to training applications. Materials can be selected based on subject area, educational level, type of training, and type of material, with each entry containing an abstract, source, and cost. The thesaurus presents the IRIS vocabulary structure. The source code provides information about the publishing source for various materials, and the source name table provides an alphabetic listing of publishing sources names. (See also W78-02882) (Wares-IPA)
W78-02883

WATER QUALITY INSTRUCTIONAL RESOURCES INFORMATION SYSTEM. VOLUME III. IDENTIFICATION NUMBER MASTER REPORT.
National Training and Operational Technology Center, Cincinnati, OH.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-262 226, Price codes: A21 in paper copy, A01 in microfiche. Report No. EPA-430/1-76-013, September 1976. Volume III of 4 volumes. 488 p.

Descriptors: *Abstracts, Documentation, Bibliographies, Publications, Classifications, Data collections, Data processing, Data storage and retrieval, Information exchange, Information retrieval, Thesauri, Training, Education, *Indexing, Books, Cataloging, Information systems, Subject indexing, Technical reports, Water Quality Instructional Resources Information System(IRIS).

The identification number master report for users of the Water Quality Instructional Resources Information System (IRIS) is presented. IRIS contains approximately 2,000 references to materials available for use in education and training programs related to water quality, cataloged with library reference information and classification according to training applications. Materials can be selected based on subject area, educational level, type of training, and type of material, with each entry containing an abstract, source, and cost. The identification number master report presents information for each reference on EPA identification number, copyright code, title, publication date, author, media type, water quality category, educational level, orginating source, cost, purchase/rent code, thesaurus subjects, special characteristics, and abstracts. (See also W78-02882) (Wares-IPA)
W78-02884

WATER QUALITY INSTRUCTIONAL RESOURCES INFORMATION SYSTEM. VOLUME IV. SUBJECT INDEX.
National Training and Operational Technology Center, Cincinnati, OH.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-262 227, Price codes: A19 in paper copy, A01 in microfiche. Report No. EPA-430/1-76-014, September 1976. Volume IV of 4 volumes. 425 p.

Descriptors: *Abstracts, Documentation, Bibliographies, Publications, Classifications, Data collections, Data processing, Data storage and retrieval, Information exchange, Information retrieval, Thesauri, Training, Education, *Indexing, Books, Cataloging, Information systems, Subject indexing, Technicalreports, Water Quality Instructional Resources Information System(IRIS).

The subject index for users of the Water Quality Instructional Resources Information System (IRIS) is presented. IRIS contains approximately 2,000 references to materials available for use in education and training programs related to water quality, cataloged with library reference information and classification according to training applications. Materials can be selected based on subject area, educational level, type of training, and type of material, with each entry containing an abstract, source, and cost. The subject index provides controlled subject access to training materials retained in IRIS by categorizing each item by as many as 16 subjects; all of these are selected from a controlled thesaurus which supports the system. (See also W78-02882) (Wares-IPA)
W78-02885

PRECIPITATION SCAVENGING (1974).
Department of Energy, Oak Ridge, TN. Technical Information Center.
Available from the National Technical Information Service, Springfield, VA 22161 as CONF-741003, Price codes: A99 in paper copy, A01 in microfiche. Proceeding of symposium held, Oct 14-18, 1974, Champaign, IL, Report ERDA Symposium Series 41, CONF-741003, 1977. 842 p, 274 fig, 82 tab, 1,087 ref. Cooridinators: R. G. Semonin and R. W. Beadle.

Descriptors: *Precipitation(Atmospheric), *Rainfall, *Aerosols, *Snowfall, *Storms, Meteorology, Chemistry, Biology, Geology, Oceanography, Pollutants, Pollutant identification, Analytical techniques, Rates, Estimating equations, Sulfur compounds, Basic data collections, On-site data collections, *Precipitation scavenging, *Pollutant distribution, Microphysics.

Papers on global aerosol production and rainfall research from an interdisciplinary group of scientists in the fields of chemistry, biology, geology, meteorology, and oceanography are presented. The general view of precipitation scavenging was given in an introductory paper focusing on problems associated with the collision efficiency for particles by drops, rain and snow scavenging, and scavenging in frontal and convective storms. It is suggested that major uncertainties about collision efficiency stem from the lack of appropriate laboratory data for submicron particles. A formula for collision efficiency for particles by drops is presented; it contain a revision of the contribution from interception. Because of uncertainties about the collection efficiency and raindrop size distributions, a gross approximation for the rain scavenging rate is suggested. Comparisons with field data lead to concern that simultaneous dry deposition may have seriously biased the data. A similar gross approximation is suggested for the snow scavenging rate. The formulas developed may be used to predict scavenging from plumes and clouds, taking into account other problems, such as modification of the pollutant in the atmosphere, precipitation within clouds, pollutant distribution, and pollutant trajectories. Finally, maximum scavenging rates to be used for safety analyses are proposed. Other papers presented concern scavenging ratio measurements, sulfur dioxide scavenging research, laboratory and theoretical microphysics, mesoscale field studies, regional studies, and scavenging modeling. A supplementary bibliography, list of symposium attendees, and an index to the symposium papers are also provided. (Wares-IPA)
W78-02886

PROCESS AND APPARATUS FOR ASCERTAINING THE CONCENTRATION OF MICROORGANISM IN A WATER SPECIMEN,
McDonnell Douglas Corp., St. Louis, MO. (Assignee).
J. W. Lanham, J. T. Holen, and N. L. Fadler.
U.S. Patent No. 4,018,652, 10 p, 10 fig, 3 tab, 2 ref; Official Gazette of the United States Patent Office, Vol 957, No 3, p 1138, April 19, 1977.

Descriptors: *Pollutant identification, *Patents, Water quality, *Water analysis, Testing, *Sampling, Evaluation, Bioindicators, Microorganisms, Laboratory tests.

The concentration of microorganisms in a known volume of a water specimen is ascertained by introducing the water specimen into a number of wells or viewing containers which have known volume and contain a nutrient medium. The mixture of water specimen and nutrient medium is incubated and the wells are observed for a change in appearance which indicates metabolic activity, that is, the existence of microorganisms in the wells. If all the wells change appearance, then it is known that the concentration exceeds a certain limit, that is, at least one cell per specific well volume. On the other hand, if none of the wells change, then it is most likely the concentration is less than one cell per total volume of specimen in the wells. A change in appearance of some but not

all of the wells indicates a concentration between the foregoing limits, and this concentration is estimated by statistical evaluation based on proven statistical computations. (Sinha-OEIS)
W78-02901

WEISER-LOWER PAYETTE WATER QUALITY SURVEYS,
Environmental Protection Agency, Seattle, WA. Region X.
D. R. Tangarone, and B. Bogue.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-257 075, Price codes: A09 in paper copy, A01 in microfiche. Working Paper No. EPA 910/8-76-098, 1975. 192 p, 93 fig, 8 tab, 5 append.

Descriptors: *Water quality, *Idaho, *Irrigation effects, *Water pollution, Baseline studies, Irrigation, Coliforms, Nutrients, Data collections, Monitoring, River basins, Watersheds(Basins), Agricultural runoff, Effluents, *Weiser River(ID), *Payette River(ID), Snake River Basin, Nonpoint pollution.

The Weiser and lower Payette Rivers, in the Middle Snake River Basin, (ID) were surveyed to determine effects of irrigation activities and point source discharges on water quality. Stream water quality and biological populations, as well as municipal, industrial, and agricultural pollution sources were monitored during 1975 in August, the irrigation season, and in December, the higher flow nonirrigation period. Extensive tables are given. Findings for the lower Payette included: (1) algal increases caused dissolved oxygen supersaturation in August; (2) 13-16% of NO2 + NO3 and total P in August was attributable to the B Lateral drain; (3) total and fecal coliform standards were violated in the lower 25 mi during both surveys; (4) during summer, nutrients, solids, conductivity, turbidity, and bacteria increased substantially from Black Canyon Dam to the mouth due to irrigation activities. For the Weiser River: (1) nutrients, solids, total organic C, conductivity, and turbidity increased dramatically below Crane Creek during the irrigation season; (2) Crane Creek was responsible for over 79% of suspended solids, nitrite and nitrate, and total P, and 56% of ammonia over the entire 100-mi reach of the river under study in August though no effects were detected in December; (3) total and fecal coliform standards were violated in much of the river during both surveys. Pesticide concentrations were low in both rivers. The biological diversity index showed a decline in water quality for the lower Payette and upper Weiser. (Lynch-Wisconsin)
W78-02994

MAN-MADE AIRBORNE ACIDITY AND ITS DETERMINATION,
Swedish Water and Air Pollution Lab., Gothenburg.
C. Brosset, and M. Ferm.
Technical Report B 341A, December 1976. 20 p, 9 fig, 8 tab, 11 ref.

Descriptors: *Acidity, *Air pollution, *Water pollution, Acids, Methodology, Precipitation(Atmospheric), Ions, Hydrogen ion concentration, Pollutants, *Pollutant identification, *Gran's titration method, Norway, Sweden, Titration.

A continuous increase in precipitation acidity has been noted in northwest Europe in recent decades, probably contributing to increasing water system acid levels observed in southern Norway and western Sweden. Drastic ecological changes have resulted, including fishkill. To identify and monitor acid emissions and aerial transport, it was concluded in this study that Gran's titration method was a significant improvement over pH tests. Man-made airborne acidity in most case is unneutralized part of hydrogen ion introduced into precipitation or particles as H2S04, HN03, or other strong acids. The neutralizng agent in air is usually NH3; or other strong acids. The neutralizing agent in air is usually NH3; some oxides present in particles may contribute to neutralization. Using Gran's plot and the associated extrapolation, the unneutralized part of hydrogen ions can be determined exactly, as long as the slope of the pseudolinear interval is due to the semiweak acid HS04(-) only. If the pseudolinear interval is considerably shorter, and its slope due to other sulphate concentration, Gran's plot cannot be used. Acid-base titration using Gran's method involves potentiometric measurement of the amount of hydrogen ions left in a sample after addition of known amounts of hydroxide ions. The measured amount of hydrogen ions is plotted in a diagram against the amount of hydroxide ion added. (Lynch-Wisconsin)
W78-02995

EVALUATION OF THE ALGAL ASSAY PROCEDURE,
North Carolina Univ. at Chapel Hill. School of Public Health.
C. M. Weiss.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-256 226, Price codes: A04 in paper copy, A01 in microfiche. Report No. EPA-600/3-76-064, June, 1976, NTIS PB-256 226, 57 p, 1 fig, 33 tab, 18 ref, 1 append. 1BA 031, R800399.

Descriptors: *Bioassay, *Algae, *Nutrients, Phosphorus, Nitrogen, Lakes, Rivers, Impoundments, Trophic levels, Eutrophication, Water quality, Filtration, Autoclaves, North Carolina, Biomass, Analytical techniques, Bottle test, Selenastrum capricornutum.

From 345 alagl assays of surface waters in 44 North Carolina lakes, impoundments, and rivers, it was concluded that pretreatment of water samples by autoclaving provides a good indication of total growth potential of a reseeded test alga, while membrane filtration pretreatment indicates ambient growth potential. Samples spiked with phosphorus and nitrogen established the growth-limiting nutrient, and reference to original nutrient levels indicated nitrogen; phosphorus ratio necessary for optimum support of the test alga, Selenastrum capricornutum. This method produces comparable results to the more complicated assay spiking procedure. For phosphorus-limited water with autoclaving pretreatment (104 assays), the control algal biomass had a mean concentration of 5.31 mg/l, whereas with filtration pretreatment (191 assays) the mean biomass was 1.37 mg/l. Nitrogen-limited water after autoclaving (132 assays) had a mean biomass of 12.15 mg/l, and after filtration 9.81 mg/l. While both phosphorus and nitrogen were limiting, following autoclaving (105 assays) mean biomass was 4.70 mg/l and after filtration 0.92 mg/l. The consistent pattern of soluble nitrogen and phosphorus to the indicated limitation of either one or both suggests this ratio is useful in defining which nutrient is limiting for that particular body of water. Water quality data for each water body is presented in tables.
W78-02996

SALMONELLA IN SURFACE WATERS OF CENTRAL NEW YORK STATE,
New York State Coll. of Agriculture and Life Sciences, Ithaca.
For primary bibliographic entry see Field 5C.
W78-03004

ESTIMATION OF NATURAL POLLUTION LOADS FROM STREAMFLOW MEASUREMENTS IN REMOTE CATCHMENTS,
Northern Forest Research Center, Edmonton (Alberta).
For primary bibliographic entry see Field 5B.
W78-03005

CHROMATOGRAPHIC INVESTIGATION OF INOSITOL PHOSPHATE ESTERS IN LAKE WATERS.
Wisconsin Univ.-Madison. Water Chemistry Lab., Water Chemistry Laboratory, University of Wisconsin, Madison.
Environmental Science and Technology, Vol. 11, No. 5, p 497-501, May, 1977. 4 fig, 2 tab, 20 ref.

Descriptors: *Phosphorus, *Phosphates, *Chromatography, *Lakes, Nutrients, Wisconsin, Methodology, Foaming, *Pollutant identification, *Inositol, *Lake Mendota(WI), Esters, Inositol phosphate esters, Hydroxyl groups.

The existence and concentrations of inositol phosphate esters in Lake Mendota (WI) were determined using alkaline bromation and gel permeation chromatography. Inositol phosphate (IP) esters result from replacement of one to six hydroxyl groups of inositol with orthophosphate anions. Wind-generated foam samples were collected in fall 1974 along the southern and eastern parts of the lake; water samples were collected in the 'deep hole' area in 1974 and 1975 with a pre-equilibrated plexiglas Van Dorn sampler. Percentages of total phosphorus present as inositol phosphate esters averaged 19% for lake foam and 26% for lake water. Estimated spring and summer IP concentrations in Lake Mendota were 3-15 micrograms P/l. The molecular-size distribution patterns of native or alkaline bromated samples were determined primarily on Sephadex G-25 in a 2.5 X 70 cm column operating in the ascending mode. The foam was greatly enriched in high-molecular-wt dissolved carbon, nitrogen and phosphorus, and dissolved organic phosphorus and was concluded to be of natural origin. Temperature and phosphorus measurements in the water column showed that the surface water was warmer, more highly colored, and had higher phosphorus concentrations than the lower strata. Results of this study indicate that the lower IP esters are the dominant forms in filtered and non-filtered foam samples, and in filtered, concentrated lake water. (Lynch-Wisconsin)
W78-03007

POLLUTION MONITORING WITH TOTAL ORGANIC CARBON ANALYSIS,
Northeastern Univ., Boston, MA. Dept. of Civil Engineering.
R. L. Chandler, J. C. O'Shaughnessy, and F. Blanc.
Journal Water Pollution Control Federation, Vol. 48, No. 12, p 2791-2803, December, 1976. 11 fig, 2 tab, 2 ref. 73-05.

Descriptors: *Carbon, *Water quality, *Biochemical oxygen demand, *Chemical oxygen demand, *Monitoring, Analytical techniques, Effluents, Sewage treatment, Waste water treatment, Automatic control, Rivers, Massachusetts, *Total organic carbon(TOC), Assabet River(MA).

Total organic carbon (TOC) may be used as an alternative to chemical or 5-day biochemical oxygen demand (BOD 5 and COD) tests once correlations have been determined. This paper evaluates the relationship of TOC to BOD5 and COD for six municipal wastewater treatment plants in eastern Massachusetts and for the Assabet River, which receives effluents from five of the plants. The sites included an extended aeration facility without primary clarification to a conventional activated sludge facility, three trickling filter plants, and an advanced plant employing a conventional activated sludge system followed by a nitrifying activated sludge system. Hourly samples of unchlorinated effluents were collected at each plant, and samples were taken at various locations along the river. The TOC analyzer oxidizes organic carbon to carbon dioxide, then reduces the CO2 to methane, is analyzed using a flame ionization detector. Results are given as direct mg C/l concentrations. It was concluded that: (1) a significant correlation exists between BOD5 and TOC

for domestic wastewater; (2) the correlation of BOD5 to TOC was stronger than for COD to TOC for a treated domestic secondary effluent; (3) TOC was useful for monitoring wastewater; (4) when all river samples were considered, BOD5 and TOC correlated significantly at the 0.01 level; and (5) with higher river flow, the BOD5 to TOC correlation decreased sharply. (Lynch-Wisconsin)
W78-03009

MACROPHYTE SUCCESSION IN SWEDISH LAKES CAUSED BY DEPOSITION OF AIRBORNE ACID SUBSTANCES,
Swedish Water and Air Pollution Research Lab., Gothenburg.
For primary bibliographic entry see Field 5C.
W78-03022

APPLICATION OF UNDERWATER LIGHT MEASUREMENTS IN NUTRIENT PRODUCTION STUDIES IN SHALLOW RIVERS,
Ontario Ministry of the Environment, Rexdale. Limnology and Toxicity Section.
For primary bibliographic entry see Field 5C.
W78-03023

THERMALLY STRATIFIED ACID WATER IN LATE WINTER - A KEY FACTOR INDUCTING SELF-ACCELERATING PROCESSES WHICH INCREASE ACIDIFICATION,
Swedish Water and Air Pollution Research Lab., Gothenburg.
For primary bibliographic entry see Field 5C.
W78-03028

ABYSSAL MEIOBENTHOS IN THE BAY OF BISCAY: I. CONSIDERATIONS ON QUANTITATIVE DATA, (IN FRENCH),
Centre d'Oceanographie, Marseille (France). Station Marine d'Endoume.
A. Dinet, and M-H. Vivier.
Cah Biol Mar 18, p 85-97, 1977.

Descriptors: *Bay of Biscay(France), Sampling, Meiobenthos, *Pollutant identification, *Organic matter, *Bacteria, Granulometry, *Sediments.

Reineck-box samples were taken in the Bay of Biscay (France) during 1972-1974. An analysis of the quantitative variations of meiobenthos was made, with particular reference to granulometry of sediments and organic matter data. These variations may be explained by the high diversity of substrata found within rather small areas. Population abundance cannot be directly correlated to the amount of organic material in sediment. It seems to be subordinate to an intermediate agent, probably bacteria, which allows utilization of the primary energetic level by meiofauna.--Copyright 1978, Biological Abstracts, Inc.
W78-03030

GREAT LAKES WATER QUALITY, FIFTH ANNUAL REPORT TO THE INTERNATIONAL JOINT COMMISSION.
International Joint Commission-United States and Canada. Great Lakes Water Quality Board.
For primary bibliographic entry see Field 5G.
W78-03041

CALCULATION METHODS IN THE HYGIENIC STANDARDIZATION OF CHEMICAL WATER CONTAMINATION, (IN RUSSIAN),
Moskovskii Gosudarstvennyi Meditsinskii Inst. (USSR). Dept. of General Hygiene.
S. A. Shigan.
Gig Sanit 11, p 15-20, 1976.

Descriptors: *Water quality standards, *Toxicity(Chronic), Methodology, Water pollution, *Chemical compounds, Forecasting, *Pollutant identification.

Data substantiating the calculation methods for forecasting the chronic toxicity of substances to accelerate their hygienic standardization in water is presented. More reliable results can be obtained by introducing the regression equation for chemically related groups of compounds and using toxicometric parameters. The conditions and the practical use of calculation equations are determined and the reliability of the suggested mathematical methods of forecasting is tested.--Copyright 1978, Biological Abstracts, Inc.
W78-03063

DIRECT MEASUREMENT OF DISSOLVED ORGANIC CARBON RELEASE BY PHYTOPLANKTON AND INCORPORATION BY MICROHETEROTROPHS,
Georgia Univ., Athens. Dept. of Microbiology.
W. J. Wiebe, and D. F. Smith.
Marine Biology, Vol. 42, No. 3, p. 213-223, 1977. 2 fig, 31 ref.

Descriptors: *Carbon, Algae, Phytoplankton, Eutrophication, Laboratory tests, Analytical techniques, Primary productivity, Isotope studies, Pollutant identification, *Kinetic tracer analysis, *Microheterotrophs, Australia, Dissolved organic carbon.

Techniques are described for measuring photosynthetically produced dissolved organic carbon (PDOC) through kinetic tracer analyses. Measurements were made in the laboratory on water samples taken from the South West Arm of the Port Hacking estuary in Australia. Measurements showed that the steady-state rate of PDOC production was 0.10 to 0.13 mg C.m-3.h-1. The rate of PDOC incorporation into microheterotroph particulate organic carbon was 0.10 to 0.12 mg C.m-3.h-1. The rate at which PDOC was respired to CO2 was 0.001 to 0.003 mg C.m-3.h-1. The PDOC makes up only about 0.1% of the total dissolved organic carbon. The size class of particles associated with PDOC producton differed from the size class responsible for uptake of PDOC. More than half of the PDOC production was associated with particles having a nominal diameter range of 20 to 63 micrometers, while this fraction was responsible for less than 10% of the incorporation. The studies are described as initial efforts but provide an insight into the roles of microheterotrophs. (Coyle-Wisconsin)
W78-03068

AUTOMATIC SORTING OF ZOOPLANKTON BY ISOPYCNIC SEDIMENTATION IN GRADIENTS OF SILICA: PERFORMANCE OF A 'RHO SPECTROMETER',
Rutgers - The State Univ., New Brunswick, NJ. Waksman Inst. of Microbiology.
C. A. Price, J. M. St. Onge-Burns, J. B. Colton, and J. E. Joyce, Jr.
Marine Biology, Vol. 42, No. 3, p. 225-231, 1977. 3 fig, 6 ref.

Descriptors: *Spectrometers, *Laboratory equipment, Fish eggs, Invertebrates, Zooplankton, Silica, Sedimentation, Pollutant identification, *Zooplankton sorting, Fish larvae.

Using a Rho Spectrometers apparatus, a system for analysis of large numbers of plankton samples offers a substantial decrease in the amount of manual sorting required. The apparatus consists of a 15.6-1 cyclinder, a moveable piston for displacing the gradient from the top, and an ejector tube for collecting successive layers of the gradient. A gradient generator suitable for up to 30 Rho Spectrometers is also described. In a typical separation, about 100 ml of preserved zooplankton are layered over a 13-1 gradient, which is 0-45% v/v in Ludox AM. After overnight sedimentation and equilibration, fish eggs are recovered from the top of the gradient, invertebrates from the central part, and fish larvae from the bottom of the gradient. In many cases 90% of the fish larvae are separated from 95% of the invertebrates. Absolute comparisons of the efficiency of sorting by Rho Spectrometry and hand sorting is difficult. But the use of density gradients of silica sol in the spectrometer makes possible semiautomatic sorting of fish eggs and fish larvae from the bulk of invertebrates for a majority of plankton samples of typical size and diversity. (Coyle-Wisconsin)
W78-03071

AERIAL INPUT OF HEAVY METALS INTO AN AQUATIC ECOSYSTEM,
Greenfield, Attaway and Tyler, Inc., San Rafael, CA.
For primary bibliographic entry see Field 5B.
W78-03074

THE DETERMINATION OF DIFFERENT FORMS OF METAL IONS IN NATURAL WATERS, (IN RUSSIAN),
Akademiya Nauk URSR, Kiev. Inst. Hidrobiologii.
P. N. Linnik, and B. I. Nabivanets.
Gidrobiol Zh 13(1), p 103-111, 1977.

Descriptors: *Pollutant identification, *Metal ions, Absorption, Manganese ions, *Path of pollutants, *Desna River(USSR), *Dnieper River(USSR), Electro dialysis, Gel chromatography, Membrane filtration, Migration, Rivers, Chemiluminescence.

Data on the forms of metal ion migration in natural waters are necessary for understanding metal assimilation by aquatic organisms, for preparing water for drinking and other purposes and for detecting commercial minerals. A technique based on chemiluminescence in combination with membrane filtration, electrodialysis, electromigration and gel chromatography was developed. Results of studies on concentrations of suspended, dissolved, complex-bound and unbound Mn in the Dnieper and Desna (USSR) Rivers are presented in illustration of the technique.-Copyright 1978, Biological Abstracts, Inc.
W78-03075

USE OF ARTHROPODS TO EVALUATE WATER QUALITY OF STREAMS,
Wisconsin Dept.of Natural Resources, Madison.
W. L. Hilsenhoff.
Technical Bulletin No. 100, 1977. 16 p, 1 fig, 9 tab, 11 ref, 1 append.

Descriptors: *Wisconsin, *Streams, *Water quality, *Insects, Water pollution, Sampling, Methodology, Data collections, *Bioindicators, Pollutant identification, *Arthropods, *Biotic index, Generic diversity, Diversity indexes, Water quality indexes.

A biotic index developed from insect sampling of 53 sites on 47 Wisconsin streams provides a sensitive and effective method for evaluating present water quality and past disruptions of all Wisconsin streams. To calculate the index, 29 sites undisturbed by human activities and 24 suspected of pollution were sampled. The index, modified from an earlier study, was computed by assigning a value of zero to genera known to be found only in the cleanest streams, five of genera inhabiting only extremely polluted waters, and intermediate values as appropriate. For a given unknown stream, the assigned value of genera is then multiplied by the number of individuals collected and an average is taken. A table presents the initial 53 sites ranked by biotic index which is compared with physical and chemical parameters. Basic oxygen demand, lowest dissolved oxygen, suspended solids, total nitrogen, total chlorides, and lowest maximum temperature all correlated significantly with the biotic index. The index tended to be higher when water temperatures were highest (June and September. A diversity index was judged unreliable for gauging water quality, at

least for small cold streams which typically have restricted fauna. The biotic index was applied to 41 additional sites on streams in the Dane-Jefferson Co. transect, Wood-Clark Co. transect, and Barron-Polk Co. transect, with an index value of < 1.75 rated excellent (6 sites, 1.75-2.25 good (14), 2.25-3.00 fair (14), 3.00-3.75 poor (6), and > 3.75 very poor (1). (Lynch-Wisconsin)
W78-03078

ENVIRONMENTAL BASELINE FOR MAUMEE BAY,
National Oceanic and Atmospheric Administration, Ann Arbor, MI. Great Lakes Environmental Research Lab.
A. P. Pinsak, and T. L. Meyer.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-266 007, Price codes: A08 in paper copy, A01 in microfiche. Great Lakes Basin Commission, Maumee River Basin Level B Study, MRB Series No. 9, August 1976. 165 p, 44 fig, 27 tab, 79 ref.

Descriptors: *Baseline studies, *Water resources, *Environmental effects, Lakes, Streams, Limnology, Erosion, Aquatic biology, Circulation, Land use, Resources development, Water quality, *Maumee Bay, *Lake Erie, Great Lakes Basin Commission.

A Maumee River Basin Level B Planning study was initiated in 1973 to consider and evaluate problems concerned with erosion and sediment transport and deposition, land use, flooding, water supply, recreation, and water quality in the basin and the relationship of the basin to Maumee Bay and Lake Erie. The objective of the study is the development of a basin-wide coordinated plan by affected local, regional State, and Federal agencies for optimum management of the water and land resources in the basin. This particular aspect of the comprehensive study, the environmental baseline for Maumee Bay, describes the limnology of the Bay, the distribution of significant variables in time and space, and the interrelationship between the Bay and the drainage basin on the one side and Lake Erie on the other. Problems indigenous to Maumee Bay, as defined by the users, are assessed and reduced to their significant elements. In addition, a numerical technique is applied to the simulation of water movement, and dispersion and disposition of particulate and some dissolved material being carried by the water. (Sinha-OEIS)
W78-03095

AN ESTIMATE OF THE INFLUENCE OF SEDIMENT CONCENTRATION AND TYPE ON REMOTE SENSING PENETRATION DEPTH FOR VARIOUS COASTAL WATERS,
National Aeronautics and Space Administration, Langley Station, VA. Langley Research Center.
C. H. Whitlock.
Available from the University of Microfilms. NASA Technical Memorandum No NASA TM X-73906, March 1976. 17 p, 3 fig, 2 tab, 10 ref.

Descriptors: *Remote sensing, *Coasts, *Sediment distribution, *Monitoring, Water quality, Light penetration, *Water pollution monitoring, Environmental quality, Absorption coefficient, US East coast, Gulf coast, Penetration depths.

Under the assumptions of collimated light, a homogeneous water column, zero molecular scattering, and constant ratio of volume scattering function to scattering coefficient, estimates of the remote sensing depth parameter, Z90, are made for various coastal waters at 540 nm. Calculations indicate that sediment concentration and type have a strong influence on remote sensing depth when concentrations are below 5 mg/l. Above 5 mg/l, the absorption coefficient of the sediments become large in comparison to that of water causing Z90 values to be less than 2 m with only small differences between various sediment types. (Sinha-OEIS)
W78-03102

OIL SPILL IDENTIFICATION BIBLIOGRAPHY,
Coast Guard Research and Development Center, Groton, CT.
A. P. Bentz.
Available from the National Technical Information Service, Springfield, VA 22161 as AD/A-029 126, Price codes: A02 in paper copy, A01 in microfiche. Office of Research and Development Report No. CG-D-41-76, March 1976. 10 p, 96 ref.

Descriptors: *Pollutant identification, *Oil spills, *Bibliographies, Environmental effects, Oil pollution, *Outer Continental Shelf.

The literature reviewed through March 1976 includes some of the latest state-of-the-art techniques, e.g. low temperature luminescence, field ionization mass spectrometry, double-beam fluorescence and simultaneous high resolution duel detection gas chromography. Some of the articles will provide more leading references as well as the names of current researchers in the field of oil identification. Two major sources of non-referenced papers are: the abstracts of the annual 'Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy'; and the biannual proceedings of the 'Joint Conference on Prevention and Control of Oil Pollution', sponsored by the U.S. Environmental Protection Agency, the U.S. Coast Guard and the American Petroleum Institute. (Sinha-OEIS)
W78-03105

BASIC REMOTE SENSING INVESTIGATION FOR BEACH RECONNAISSANCE,
Environmental Research Inst. of Michigan, Ann Arbor.
For primary bibliographic entry see Field 2L.
W78-03107

AVAILABILITY AND CHEMICAL CHARACTERISTICS OF GROUND WATER IN CENTRAL LA PLATA COUNTY, COLORADO,
Geological Survey, Lakewood, CO. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-03118

AVAILABILITY AND CHEMICAL QUALITY OF GROUND WATER IN THE CRYSTAL RIVER AND CATTLE CREEK DRAINAGE BASINS NEAR GLENWOOD SPRINGS, WEST-CENTRAL COLORADO,
Geological Survey, Lakewood, CO. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-03119

WATER QUALITY OF SELECTED STREAMS IN THE COAL AREA OF SOUTHEASTERN MONTANA,
Geological Survey, Helena, MT. Water Resources Div.
For primary bibliographic entry see Field 5B.
W78-03121

WATER RESOURCES DATA FOR ALASKA, WATER YEAR 1976.
Geological Survey, Anchorage, AK. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-03122

WATER RESOURCES DATA FOR ARIZONA, WATER YEAR 1976.
Geological Survey, Tucson, AZ. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-03123

WATER QUALITY OF TAMPA BAY, FLORIDA: WET-WEATHER CONDITIONS, OCTOBER 1971,
Geological Survey, Tampa, FL. Water Resources Div.; and Geological Survey, Lawrence, KS. Water Resources Div.
C. R. Goodwin, J. S. Rosenshein, and D. M. Michaelis.
Open-file report FL-75005, 1975. 88 p, 2 fig, 10 tab, 4 ref.

Descriptors: *Water quality, *Florida, *Bays, *Baseline studies, *Chemical analysis, Metals, Biological properties, Physical properties, Sampling, Sites, Data collections, Environmental effects, *Tampa Bay(Fla).

Water-quality data for Tampa Bay, Florida, during the period October 18 to 22, 1972, is presented in tabular form. The sampling followed a 12-week period of moderately excessive rainfall. These data provide a broad base of information to compare future sampling results for evaluating various changes in the bay. The water quality data also can be used in a digital simulation model of Tampa Bay. Water samples were collected at 95 sites and determinations were made for specific conductance, pH, temperature, dissolved oxygen, turbidity, nitrogen species, silica, phosphorus, carbon, metals, phenols, coliform bacteria, streptococci bacteria, biochemical oxygen demand and pesticides. Not all parameters were determined at each sampling site. (Woodard-USGS)
W78-03128

SELECTED AQUATIC PLANTS AS INDICATOR SPECIES FOR HEAVY METAL POLLUTION,
Bedford Inst. of Oceanography, Dartmouth (Nova Scotia); and Fisheries and Marine Service, Halifax (Nova Scotia). Dept. of Environment.
S. Ray, and W. White.
Journal of Environmental Science and Health - Environmental Science and Engineering, Vol. A11, No. 12, p 717-725, 1 fig, 2 tab, 12 ref. 1976.

Descriptors: Environmental effects, *Water pollution, *Heavy metals, *Aquatic plants, Algae, Copper, Zinc, Lead, Cadmium, Water quality, *Bioindicators, Monitoring, *Pollutant identification, Canada, Pondweeds, Equipetum, Biological monitors, *Nepisiguit River(NB), Oscillatoria.

It is suggested that in order to evaluate aquatic plants as biological monitors of heavy metal pollution, the plants should be representative of the locality, abundant and easy to collect, and that they should have high tolerance of the heavy metals and a high concentration factor. Two vascular plants, Potamogeton and Equisetum, and a blue algae, Oscillatoria, from the Nepisiguit River were used in the present study. Analysis of copper, zinc, cadmium and lead in various tissues of these plants clearly established the usefulness of the three species as biological monitors to qualitatively reflect the long-term water quality of an area. (Chilton-ORNL)
W78-03141

CLADOCERA (CRUSTACEA) AS INDICATORS OF WATER POLLUTION, (IN RUSSIAN),
A. V. Makrushin.
Gidrobiol Zh 12(5), p 101-104, 1976.

Descriptors: *Crustaceans, Bioindicators, Water pollution, *Pollutant identification, Oligotrophy, Trophic level, *Saprobity(Cladocera).

The method of water pollution analysis by calculation of the number of saprophytic Cladocera in a given zone is described. Cladocera can be divided into 3 groups according to degree of saprobity in given conditions. The determination value of the

same species in different zones of their areal may be dissimilar. The 1st and most numerous group is comprised of species typical a oligo- and beta - meso-saprobic conditions and cannot serve as an indicator for other polluted zones. The 2nd, and very small group indicates only oligosaprobity, while the 3rd indicates the presence of a significant amount of easily disintegrated organic substances or a very high degree of trophy. Representative species of each group are listed.--Copyright 1978, Biological Abstracts, Inc.
W78-03144

GAS CHROMATOGRAPHIC DETERMINATION OF 2,4-D TRACE QUANTITIES, (IN RUSSIAN),
Belorussian Sanitary-Hygienic Research Inst., Minsk (USSR).
M. G. Mil'china, A. L. Pertsovskii, and Yu. A. Prismotrov.
Gig Sanit 8, p 72-75, 1976.

Descriptors: *Pollutant identification, *2-4-D, *Gas chromatography, Trace elements, Methodology, Analytical techniques, *Pesticide residues.

A modified Marquardt and Luce method is described based on transformation of 2,4-D into 2,4-dichlorphenol by fusing 2,4-D with pyridine hydrochloride and subsequent analysis on a gas chromatograph with electron detector. Steps to determine 2,4-D salts and derivatives, in water, soil and plant and animal tissue are explained. The method sensitivity is 0.01 mg/l, 0.01 mg/kg, and 0.05-0.1 mg/kg, respectively. Relative error is 10%.--Copyright 1978, Biological Abstracts, Inc.
W78-03146

TECHNIQUES FOR THE ISOLATION OF ENTEROPHAGES FOR THE HYGIENIC STUDY OF WATER, (IN ITALIAN),
Siena Univ. (Italy). Inst. of Hygiene.
M. Zanda.
Riv Ital Ig 36(1-3), p 33-42, 1976.

Descriptors: *Isolation, *Pollutant identification, *Enterophages, Public health, Analytical techniques, Tracers.

Basic techniques for isolation and count of enteric phages as surface water pollution tracers are reported.--Copyright 1978, Biological Abstracts, Inc.
W78-03149

AUTOMATIC MEASUREMENT OF TOTAL OXYGEN DEMAND APPLIED TO THE CONTROL OF WASTE WATERS (LA MESURE AUTOMATIQUE DE LA DEMANDE TOTALE EN OXYGENE APPLIQUEE AU CONTROLE DES EAUX RESIDUAIRES),
Montpellier-2 Univ. (France). Lab. de Genie Chimique, Traitement et Epuration des Eaux.
J. L. Marty, and R. Ben Aim.
Techniques et Sciences Municipales-L'Eau, Vol. 71, No. 12, p 531-540, December, 1976. 14 fig, 1 tab, 13 ref.

Descriptors: *Analytical techniques, *Dissolved oxygen analyzers, *Dissolved oxygen, *Monitoring, Biochemical oxygen demand, Chemical oxygen demand, Automation, Automatic control, Industrial wastes, Food processing industry, Waste water treatment.

Analytic experiments were run to determine effective pollution parameters with a view towards using automatic instrumentation to control pollutants in urban and industrial waste waters. While BOD5 and COD are the parameters most used, TOD was often shown to be a more complete measurement. A description of the method and equipment used for measuring TOD is given. Suspended particles and the effects of dissolved oxygen can present problems in measuring TOD; nitrites, sulfates, metallic cations, and chlorides were also found to interfere in obtaining accurate measurements. Graphs depict the interference effects. Correlations between TOD and COD and between TOD and BOD5 were made. The correlations are expressed for urban wastes and for wastes from dyeing, distillery, and food industries. Results showed that a TOD meter can be used to measure total organic carbon and oxidizable matter; its use in rapid monitoring of on-site industrial wastes is being implemented. (Blits-FIRL)
W78-03169

SPECTROSCOPIC DETERMINATION OF METALS IN WASTEWATERS (PRIMENENIE METODA POLYAROGRAFII S NAKOPLENIEM (INVERSIONNOI VOL'TAMPEROMETRII) V ANALIZE MAKRO I MIKROOBEKTOV),
T. E. Morgulis, A. I. Kuznetsova, and I. D. Raikhbaum.
Zavodskaia Laboratoriia, Vol 43, No 4, p 429-432, 1977. 2 fig, 4 tab, 14 ref.

Descriptors: *Analytical techniques, *Metals, *Electrodes, *Spectroscopy, *Water analysis, Pollutant identification, Waste identification, Waste water treatment.

Spectral analysis of metals (Al, Fe, Ti, Ni, Co, Mn, Sn, Zn, Pb, Mo, Cr, V, Cu, Ba, Sr and Cd) in the dry residue of wastewater is described. The carbon electrode used was provided with an open hole to reduce heat dissipation. Stallwood's electrode used forced cooling to reduce interference due to high concentrations of calcium, and to improve the determination of volatile elements whose analytical lines are between 310 and 350 nm. The combination of these two electrodes was used for the high-sensitivity determination of Zn, Cu, and Cd. Comparison with atomic absorption analysis revealed that the coefficients of variation are 12-35%. (Takacs-FIRL)
W78-03177

SURFACE PROPERTIES OF PETROLEUM REFINERY WASTE OIL EMULSIONS,
Carnegie-Mellon Univ., Pittsburgh, PA. Dept. of Civil Engineering.
R. G. Luthy, R. E. Selleck, and T. R. Galloway.
Environmental Science and Technology, Vol 11, No 13, p 1211-1217, December, 1977. 10 fig, 3 tab, 19 ref.

Descriptors: *Emulsions, *Oil-water interfaces, *Oily water, *Analytical techniques, *Surfactants, Suspension, Oil wastes, Industrial wastes, Separation techniques, Physicochemical properties, Polyelectrolytes, Waste water treatment, Pollutant identification.

The surface of properties of refinery waste water oil emulsions were examined with respect to oil emulsion stability and ease of coagulation. Various organic coagulant aids which might be used to remove the waste oil from API separator effluents were compared. Electrokinetic properties of the oil emulsions, ranging in strength from 100 to 700 mg/liter, were similar, with positive charges on the droplets at low pH levels and negative charges occurring above a pH of 5.0, regardless of ionic strength. A decrease in electrokinetic mobility was observed with increases in the ionic strength of the suspension, verifying the suppression of the electrical double layer by the monovalent ions present in the solution. The data also verified the hypothesis that the surface charges are dependent upon surfactants contained in the oil phase and on H+ and OH- ions in the aqueous phase, regardless of the source of the oil or the ionic strength of the water. The presence of anionic surfactants in waste water produced marked differences in surface properties of crude oils and separator float oil emulsions. The relatively highly charged cationic polyelectrolytes, in particular a 75% charged PDADMA cationic polyelectrolyte, were much more effective as waste oil droplet coagulants than the anionic and nonionic polyelectrolytes. (Schulz-FIRL)
W78-03185

AVOIDANCE BY HERRING OF DISSOLVED COMPONENTS IN PULP MILL EFFLUENTS,
Fisheries and Marine Service, St. Andrews (New Brunswick). Biological Station.
For primary bibliographic entry see Field 5C.
W78-03194

5B. Sources Of Pollution

DISSOLVED ATMOSPHERIC GAS SUPERSATURATION OF WATER AND THE GAS BUBBLE DISEASE OF FISH,
Environmental Information Services, Inc., Mercer Island, WA.
For primary bibliographic entry see Field 5C.
W78-02707

COPPER, MANGANESE, AND CHROMIUM CONCENTRATIONS IN FIVE MACROPHYTES FROM THE DELTA OF RIVER TOCE (NORTHERN ITALY),
Istituto Italiano di Idrobiologia, Pallanza.
For primary bibliographic entry see Field 5C.
W78-02710

ECOLOGICAL BUFFER CAPACITY,
Royal Danish School of Pharmacy, Copenhagen.
For primary bibliographic entry see Field 5C.
W78-02713

POLLUTION OF THE BALTIC BY CRUDE OIL PRODUCTS (ZANLECZYSZCZENIE BALTYKU SUBSTANCJAMI ROPOPOCHODNYMI),
For primary bibliographic entry see Field 5A.
W78-02716

FATE OF 2,4,-D IN FISH AND BLUE CRABS,
Syracuse Research Corp., NY.
For primary bibliographic entry see Field 5C.
W78-02728

INTERCALIBRATION OF GAS CHROMATOGRAPHIC ANALYSES FOR HYDROCARBONS IN TISSUES AND EXTRACTS OF MARINE ORGANISMS,
Woods Hole Oceanographic Institution, MA.
For primary bibliographic entry see Field 5A.
W78-02729

COASTAL WATER RESEARCH PROJECT, ANNUAL REPORT 1975,
Southern California Coastal Water Research Project, El Segundo, CA.
For primary bibliographic entry see Field 2L.
W78-02740

THE POTENTIAL BIOLOGICAL EFFECTS OF DEPLETED URANIUM ON RANGE C-74 UPON THE ALGAL FLORA OF ROCKY CREEK ON EGLIN AIR FORCE BASE,
Alabama Univ., University. Dept. of Biology.
For primary bibliographic entry see Field 5C.
W78-02748

PHOTODEGRADATION OF ORGANIC MATERIALS USED AS BIOMASS,
Naval Research Lab., Washington, DC.
R. A. Neihof, C. Patouillet, P. J. Hannan, and D. E. Klemme.
Available from the National Technical Information Service, Springfield, VA 22161 as AD/A-028 347, Price codes: A02 in paper copy, A01 in microfiche. NRL Memorandum Report No. 3320, July 1976, 17 p. 12 ref, 2 fig, 5 tab.

Descriptors: *Pesticides, *Degradation(Decomposition), *Toxicity, *Bioassay, *Herbicides, *Algicides, *Water pollution sources, *Waste water, *Oil wastes, Deterioration, Algal control, Fouling, Corrosion, Laboratory tests, Light, Discharge(Water), Fuels, *Photodegradation, *Thiopyridine, *Photo-sensitive biocides.

In an effort to evaluate the possible environmental impact of discharging biocide-containing ballast or displacement water from shipboard fuel tanks, a study has been made of the effects of sunlight on the toxicity of three organic biocides to algae. A thiopyridine and a thiocyanate compound in solution in seawater lost more of their toxicity in less than 24 hours exposure to sunlight; a triazine compound was relatively unaffected. The results suggest that it may be possible to select a biocide which is active indefinitely against the microorganisms which infest ships' fuel tanks but becomes degraded so rapidly when discharged that no serious impact on the marine environment would result. (Katz)
W78-02751

PRELIMINARY EVALUATION OF WATER QUALITY OF PROPOSED FOUNTAIN LAKE, COLORADO.
Army Engineers Waterways Experiment Station, Vicksburg, MS.
For primary bibliographic entry see Field 5A.
W78-02755

SUMMARY REPORT, ARCADIA LAKE WATER-QUALITY REPORT STUDY,
Army Engineer Waterways Experiment Station, Vicksburg, MS.
For primary bibliographic entry see Field 5A.
W78-02756

AQUATIC DISPOSAL FIELD INVESTIGATIONS, EATONS NECK DISPOSAL SITE, LONG ISLAND SOUND; APPENDIX A: INVESTIGATIONS OF THE HYDRAULIC REGIME AND THE PHYSICAL CHARACTERISTICS OF BOTTOM SEDIMENTATION,
Yale Univ., New Haven, CT. Dept.of Geology and Geophysics.
For primary bibliographic entry see Field 5E.
W78-02782

AQUATIC DISPOSAL FIELD INVESTIGATIONS, EATONS NECK DISPOSAL SITE, LONG ISLAND SOUND; APPENDIX D: PREDISPOSAL BASELINE CONDITIONS OF DEMERSAL FISH ASSEMBLAGES,
New York Ocean Science Lab., Montauk.
For primary bibliographic entry see Field 5E.
W78-02783

FORECAST OF THE CHANGE IN THE HYDROLOGIC BUDGET, LEVEL, AND MINERAL CONTENT OF LAKE BALKHASH IN THE NEXT TEN YEARS,
For primary bibliographic entry see Field 2H.
W78-02805

CHARACTERISTICS OF DREDGED BOTTOM SEDIMENTS,
Northwestern Univ., Evanston, IL. Dept. of Civil Engineering.
R.J. Krizek, D. K. Atmatzidis, and J. A. FitzPatrick.
Journal of the Waterway, Port, Coastal and Ocean Division, American Society of Civil Engineers, Vol. 103, No. WW4, Proceedings Paper 13319, p 471-486, November 1977. 3 fig, 3 tab, 21 ref, 1 append. DACW 39-74-C-0090.

Descriptors: *Bottom sediments, *Correlation analysis, *United States, Dredging, Frequency, Gradation, Regression analysis, Water quality, Environmental effects, Water pollution, Metals, Chemicals, Particle size, *Dredged bottom sediments, *Chemical composition, Spoil.

Certain physical and bulk chemical characteristics of bottom sediments that are candidates for dredging were summarized for approximately 50 locations throughout the United States. According to empirical criteria that were used for the past several years, most of the sediments would be termed polluted. Based on the results of a bivariate regression analysis among the reported parameters, some plausible correlations were identified between different metals and between metals and certain fractions of organic material. None of the parameters was highly correlated with the mass of submicron particles in a dredged material. Additional site-specific data are needed to advance broader and more definitive conclusions regarding the water quality impact that might occur during dredging and disposal operations. (Roberts-ISWS)
W78-02813

POLLUTION OF LAKE MICHIGAN AND ITS TRIBUTARY BASIN, ILLINOIS, INDIANA, MICHIGAN, AND WISCONSIN.
Environmental Protection Agency, Chicago, IL. Region V.
For primary bibliographic entry see Field 5G.
W78-02828

RESEARCH PROGRAM ON HAZARD PRIORITY RANKING OF MANUFACTURED CHEMICALS, PHASE II (CHEMICALS 1-20),
Stanford Research Inst., Menlo Park, CA.
For primary bibliographic entry see Field 5A.
W78-02877

RESEARCH PROGRAM ON HAZARD PRIORITY RANKING OF MANUFACTURED CHEMICALS. PHASE II. (CHEMICAL 61-79),
Stanford Research Inst., Menlo Park, CA.
S. L. Brown, F. Y. Chan, J. L. Jones, D. H. Liu, and K. E. McCaleb.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-263 164, Price codes: A09 in paper copy, A01 in microfiche. Final Report, April 1975. 193 p, 20 fig, 20 tab, 24 ref. Report NSF-RA-E-75-190D. ECU-3386.

Descriptors: *Chemical analysis, *Chemical industry, *Chemicals, *Chemical wastes, *Chemical properties, Toxicity, Environmental effects, Hazards, Public health, Data collections, Industrial wastes, Pharmacology, Manufactured chemicals.

Chemicals 61 through 79 (including 75a) of the 80 chemicals selected by experts on trace contaminants as having the greatest potential for environmental effects were studied. Information was collected on the extent of the exposure of the environment to these chemicals (during manufacture and use) and on the possible environmental effects of this exposure (chemical, physical, and biological properties, persistence, and toxicity). A questionnaire survey of industry was conducted to determine the amount and type of losses in the manufacturing plants, and information from this survey is tabulated. Summary reports are given for each chemical, including a flow diagram showing industrial data on the amounts used for various applications, a one page assessment of the data gathered on toxicology and environmental persistence, a computer printout of a tabular summary of the important data gathered, and copies of the 25 most pertinent abstracts found in the area of toxicology. (Wares-IPA)
W78-02878

INDUSTRIAL PROCESS PROFILES FOR ENVIRONMENTAL USE CHAPTER 1, INTRODUCTION,
Radian Corp., Austin, TX.
I. A. Jefcoat, and P. W. Spaite.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-266 274, Price codes: A02 in paper copy, A01 in microfiche. Report No. EPA-600/2-77-023a, January 1977. 13 p, 2 fig, 3 tab, Parsons, T., Editor. 1AB015;ROAP 21AFH-025, 68-02-1319, Task 34.

Descriptors: *Industrial production, *Operations research, *Environmental effects, Chemicals, Bibliographies, *Process analysis, Raw materials.

A catalog of industrial processes was developed to aid in defining the environmental impacts of industrial activity in the U.S. Entries for each industry are in consistent format and form separate chapters of the catalog; companies are classified as industries if they competitively produce similar products from the same types of raw materials. Chapter 1 presents an introduction to the catalog and identifies a number of expected uses for the information contained in the various chapters, the approach to catalog development is explained, and the basic catalog format outlined. Examples of typical information to be found in subsequent chapters, along with definitions for specific catalog nomenclature are provided. Future program plans for the assessment of industrial processes and their impact on the environment are presented. Environmentally significant processes were identified by considering the kinds of equipment and the nature of input and output materials for each processing step involved in conversion of raw materials into products. Each industry is described in terms of raw materials, products, companies, environmental impact, chemical (product) tree, process flowsheets, and process descriptions, and pertinent data are appended as lists to each description. (Wares-IPA)
W78-02881

NUTRIENT REGENERATION FROM AEROBIC DECOMPOSITION OF GREEN ALGAE,
Notre Dame Univ., Ind. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5C.
W78-02992

WEISER-LOWER PAYETTE WATER QUALITY SURVEYS,
Environmental Protection Agency, Seattle, WA. Region X.
For primary bibliographic entry see Field 5A.
W78-02994

TEST OF REDFIELD'S MODEL FOR OXYGEN-NUTRIENT RELATIONSHIPS USING REGRESSION ANALYSIS,
Oregon State Univ., Corvallis. Dept. of Statistics.
For primary bibliographic entry see Field 5C.
W78-02997

DISTRIBUTION OF ARSENIC, CADMIUM, LEAD, ZINC, COPPER, MANGANESE, AND IRON CONTAINED IN THE BOTTOM SEDIMENT OF LAKE BIWA,
Kyoto Univ., Otsu (Japan). Otsu Hydrobiological Station.
J. Kobayashi, S. M. Fuji Morii, H. T. Nakashima, and S. Horie.
Ber Ohara Inst Landwirtsch Biol Okayama Univ 16(4), p 147-163, 1976.

Descriptors: *Path of pollutants, Water pollution sources, Lead, Zinc, Cadmium, Iron, Manganese, Copper, Arsenic, Bottom sediments, Lakes, *Lake Biwa(Japan), *Lake sediments, Metals, Heavy metals.

From the sediment of Lake Biwa (Japan), a total of 76 samples were collected and analyzed for As, Cd, Pb, Zn, Cu, Mn and Fe by atomic absorption spectrophotometry. As concerns the horizontal distribution of trace metals in the surface sediment

deposited in modern ages, a remarkable accumulation of As (126-450 ppm) and Mn (8300-17,300 ppm) was observed at several points near the center of the northern main part of the lake basin, where pollution had not been expected. In the southern part of the lake, the surface sediment near the Seta River which flows out of the lake was polluted by Cd and other metals (Cd 26 ppm, Pb 259 ppm, Zn 736 ppm). At other points investigated, the content of trace metals in the bottom surface sediment was much the same as that in the vertical core samples from below the level polluted by man. The high concentration of trace metals detected in the surface sediment indicated that the natural process of accumulation of trace metals has begun to be distrupted by recent human activity. Copyright 1978, Biological Abstracts, Inc.
W78-02999

DYNAMICS OF WATER-SOLUBLE ORGANIC MATTER AND BIOGENIC ELEMENTS IN BOTTOM SEDIMENTS OF THE TSYBUL'NIK BAY IN THE KREMENCHUG RESERVOIR, (IN RUSSIAN),
Akademiya Nauk URSR, Kiev. Inst. Hidrobiologii.
I. K. Palamarchuk', and A. I. Denisova.
Gidrobiol Zh 12(6), p 16-23, 1976.

Descriptors: *Organic matter, Reservoirs, Bays, Bottom sediments, *Biogenic elements, Chemical compounds, Zooplankton, Zoobenthos, Organic compounds, Nitrogen, Kremenchug Reservoir(USSR).

Stationary observations of annual dynamics for water-soluble organic matter and biogenic elements (zooplankton, zoobenthos) in the water and bottom sediments of Tsybul'nik Bay (Ukrainian SSR, USSR) made it possible to determine the amount of chemical elements migrating from the sediment to water active hydrological conditions. In heavy weather the concentration of water-soluble chemical compounds in the grounds decreases sharply, which is explained by their intensified migration to water: 1 m2 of bottom yields for 24 h 200-500 mg of organic carbon, 18-62 mg of organic nitrogen, 1.0-8.7 mg of organic phosphorus and 11-21 mg of ammonium nitrogen. Copyright 1978, Biological Abstracts, Inc.
W78-03001

STUDIES ON DEGRADATION OF ADENOSINE-5' PHOSPHOSULPHATE ADENOSINE-3'-PHOSPHATE-5'-PHOSPHOSULPHATE (PAPS) IN EXTRACTS OF ANABAENA CYLINDRICA,
Adelaide Univ. (Australia). Dept. of Agricultural Biochemistry and Soil Science.
For primary bibliographic entry see Field 5C.
W78-03002

ESTIMATION OF NATURAL POLLUTION LOADS FROM STREAMFLOW MEASUREMENTS IN REMOTE CATCHMENTS,
Northern Forest Research Center, Edmonton (Alberta).
T. Singh, and Y. P. Kalra.
Water, Air, and Soil Pollution, Vol. 7, No. 1, p. 111-116, 1977. 1 fig, 3 tab, 11 ref.

Descriptors: *Estimating equations, Streams, Streamflow, *Dissolved solids, *Solutes, *Erosion, Water pollution, *Canada, Rocky Mountain Region, Water quality, Measurement, Equations, *Marmot Creek Basin(Canada), Chemical erosion, Alberta(Canada), Pollution loads, Catchments.

A study in the Marmot Creek Basin Experimental Watershed in the Rocky Mountains of Alberta, Canada resulted in the development of equations for obtaining gross estimates of the total inorganic solutes dislodged monthly and annually from three catchments, as indicators of chemical weathering and baseline water quality levels. The equations are suitable for in-situ estimation of pollution loads directly from streamflow measurements, and are especially useful in measuring remote catchments. Water samples were collected monthly in the Cabin, Middle, and Twin creek subbasins. The following formula was used: Total solids=Na + K + Si + Cl + SO4 + F + 0.6 (total alkalinity) + NO3 + NO2 + 0.393 Ca + 0.243 (total hardness), where 0.6 is the ratio CO3:CaCO3. The flow (l/sec) at the time of sampling and the solute concentration (mg/l) showed a highly significant relationship which could be used for estimating concentration. Concentrations were combined with flow to obtain solute yields (kg/day). Prediction equations were derived by the least-squares method. Equations were for a linear model of the form: Solute yield=M(Streamflow) + B + e, where M and B are model coefficients from the data and e is error. Highest solute yield occurred in June; maximum chemical erosion occurred from May to August. High solute yields were due to high rock solubility and vegetation influence. (Lynch-Wisconsin)
W78-03005

REAL TIME SIMULATION OF NITROGEN CYCLE IN AN ESTUARY,
Resource Analysis, Inc., Cambridge, MA.
T. O. Najarian, and D. R. F. Harleman.
Journal of the Environmental Engineering Division, Proceedings of ASCE, Vol. 103, No. EE4, p 523-538, August, 1977. 10 fig, 1 tab, 13 ref.

Descriptors: *Nitrogen cycle, *Estuaries, *Model studies, *Water quality control, Mathematical models, Waste treatment, Advection, Effluents, Mixing, Biochemistry, Real time, Through-flow models.

Biogeochemical engineering models as applied to water quality control in rivers and estuaries are discussed. Hydrodynamic aspects of an estuary are the transport processes--including the advection, mixing, and dispersion of specific constituents in waste effluents, which are in turn subject to various transformation or reaction processes. Using an idealized estuary, the coupling of transport processes in an advective system with the biochemical nitrogen transformation processes is investigated. It is shown that the predicted concentrations of the nitrogen storage variables are highly sensitive to the representation of the real time (i.e., intratidal cycle) tidal motion and dispersive mixing processes within the estuary. The estuary is assumed to have uniform depth length and width and Manning roughness of 0.018. A constant freshwater inflow rate of 28 cu m/sec enters the head of the estuary, and two waste treatment plants are located on the estuary. It is demonstrated that there is a high degree of coupling between intratidal cycle transport and mixing and biochemical transfer processes in estuaries. Use of nontidal or through-flow water quality models, which grossly simplify the transport, leads to large differences in predicted nutrient concentrations, even though identical biochemical components and rate constants are used in both these and real-time models.
W78-03010

CONSEQUENCES OF DETERGENT POLLUTION OF THE SEA: EFFECTS ON REGENERATING SPONGE CUBES OF GEODIA CYDONIUM,
Institut Rudjer Boskovic, Rovinj (Yugoslavia). Center for Marine Research.
For primary bibliographic entry see Field 5C.
W78-03025

INVESTIGATIONS OF ENERGY FLOW IN SEDIMENTS OF KIEL BAY (BALTIC SEA), (IN GERMAN),
Akademiya Nauk URSR, Kiev. Inst. Zoologii.
For primary bibliographic entry see Field 2L.
W78-03029

THE TOXIC ACTION OF ENDRIN ON AQUATIC INVERTEBRATES, (IN GERMAN),
For primary bibliographic entry see Field 5C.
W78-03034

TRACE ORGANIC EMISSIONS FROM LEAD MINING-MILLING OPERATIONS,
Syracuse Univ., NY. Dept. of Civil Engineering.
J. C. Jennett, and A. J. Callier.
Journal Water Pollution Control Federation, Vol. 49, No. 3, p. 469-488, March 1977. 8 fig, 8 tab, 38 ref. NSF T-900121-03 and 04.

Descriptors: *Organic compounds, *Mine wastes, Water pollution sources, Lead, Zinc, *New Lead Belt(MO), Trace organic emissions.

Two lead mine operations in the New Belt of southeastern Missouri were studied to determine refractory organic levels in the discharged effluent of a treated industrial waste and the concomitant increase of trace organics in the receiving body of water. These organics, which are toxic, are used as chemical reagents in the milling process which separates lead and zinc sulfides. Both mine-mill treatment systems discharged more trace organics than the background levels found in the receiving streams. Organics extracted from the samples taken at Bee Fork Creek, a control stream, and from the two mine treatment systems, were generally chloroform-soluble and were recovered in largest amounts when extractions were performed at levels of pH 7 and 3. Data strongly implied that rainfall and runoff diluted trace organics recovered from the control stream as well as the two treatment systems. A correlation between the physical and chemical data and the level of trace organics recovered from a sample could not be found. Final discharge from one mine-mill treatment system contained more trace organics than the final effluent of the other. Of the two wastes from the first, the mill waste contained a higher concentration of ogranics than the excess mine water. (Coyle-Wisconsin)
W78-03036

A QUANTITATIVE STUDY OF THE STRUCTURE AND DYNAMICS OF BENTHIC SUBTIDAL ALGAL VEGETATION IN GHANA (TROPHICAL WEST AFRICA),
Ghana Univ., Legon. Dept. of Botany.
D. M. John, D. Lieberman, and M. Lieberman.
Journal of Ecology, Vol. 65, No. 2, p 497-521, July 1977. 10 fig, 4 tab, 51 ref, 1 append.

Descriptors: *Scuba diving, Aquatic life, Sampling, Depth, Data collections, Benthic fauna, Marine algae, Littoral, *Ghana(Africa), Species composition, Species diversity.

Subtidal benthic algal vegetation off Tema, Ghana at depths of eight to 30 m was surveyed by means of scuba diving. Over a seven year period an accumulation of presence-absence records was supplemented at the end of the April, 1975 growing season by the collection of material from quadrats. Over one hundred species were identified from 62 plotless dives and 57 quadrats. On the plotless samples, groupings obtained reflect depth and sampling intensity. Both stands and species were ordinated using reciprocal averaging. Results are not in conflict with those of the classifications but reveal the importance of substratum as well as depth. Species-composition based on presence-absence data showed a 10.8 percent turnover during a five year interval. There was no net gain or loss in the total number of species. The turnover is interpreted as representing local shifts in abundance rather than true immigration and extinction. Species diversity was estimated on the basis of biomass data from the quadrat samples. For purposes of comparison the samples from shallower quadrats were treated separately from those taken from deeper quadrats. Shallower sites have more species, deeper sites have greater evenness. (Coyle-Wisconsin)
W78-03037

CHNSED: SIMULATION OF SEDIMENT AND TRACE CONTAMINATION TRANSPORT WITH SEDIMENT/CONTAMINANT INTERACTION,
Oak Ridge National Lab., TN.
D. E. Fields.
Available from the National Technical Information Service, Springfield, VA 22161 as ORNL/NSF/EATC-19, Price codes: A10 in paper copy, A01 in microfiche. Report No. ORNL/NSF/EATC-19, March, 1976, 204 p. 18 fig, 9 tab, 264 ref, 6 append. W7405-eng-26.

Descriptors: *Model studied, *Sediment transport, Sediment-water interfaces, Pollutants, Water pollution, Equation, Ion exchange, Rio Grande River, Watersheds(Basins), Path of pollutants, *CHNSED, *Trace contaminant transport, Unified Transport Model(UTM), Wisconsin Hydrologic Transport Model(WHTM), SEDTRN.

CHNSED is a composite of a newly designed model of sediment transport in a rectangular stream channel system (SEDTRN), and the Wisconsin Hydrologic Transport Model (WHTM), which are components of the Unified Transport Model (UTM) under development with support from the National Science Foundation. The UTM simulates transport of a trace contaminant through a watershed ecosystem from injection into the atmosphere through deposition. In CHNSED, as in the WHTM, particulate mobilizaton (sheet erosion and overland transport) and dissolved contaminant transport associated with runoff, interflow, and base flow inputs to the channel system are considered. An ion-exchange submodel simulates the soil-contaminant-water interaction at the land surface. Following entry into the channel system, dissolved contaminant support is derived from the flow routing of the WHTM. Routing of the adsorbed fraction is controlled by sediment transport dynamics, which are governed by bedload and suspended load transport. SEDTRN is an extension of the sediment transport formulation described by R. A. Bagnold, but includes Manning's equation to determine flow rate and modifications to Stokes' law allowing calculation of particulate fall velocity in both the viscous and inertial particle settling regions. Detailed instructions are given for application of CHNSED, with an example. The sediment transport portion is also applied to the Rio Grande River. (Lynch-Wisconsin)
W78-03057

COMBUSTION EXPERIMENTS USING PENTACHLOROPHENOL ON A PILOT SCALE AND FULL-SCALE,
Swedish Water and Air Pollution Research Lab., Stockholm.
For primary bibliographic entry see Field 5E.
W78-03058

ENERGY FLOW MODEL OF AN OXYGEN-DEFICIENT ESTUARY ON THE SWEDISH WEST COAST,
Swedish Water and Air Pollution Research Lab., Gothenberg.
For primary bibliographic entry see Field 5C.
W78-03067

TRANSPORT OF TRACE METALS BY SUSPENDED PARTICULATES ON MIXING WITH SEAWATER,
University of Southern California, Los Angeles. Environmental Engineering Program.
N. Rohatgi, and K. Y. Chen.
Journal Water Pollution Control Federation, Vol. 47, No. 9, p. 2298-2316, September 1975. 10 fig, 6 tab, 9 ref.

Descriptors: *Path of pollutants, *Seawater, *Suspended solids, *Sediments, *Trace elements, Oxidation, California, Water pollution sources, Hyperion Treatment plant(Los Angeles, CA).

A study was made of trace metals such as cadmium, chromium, copper, iron, manganese, nickel, lead and zinc in the wastewater effluents of the Hyperion Treatment plant, Los Angeles, California. Objectives were to determine whether the metals are released from waste effluent particularates after discharge into a saline environment (the Pacific Ocean and, if so, to what extent they are released and what the mechanisms are for their mobilization from particularates which can enhance the long distance transport. Particular interest was given to digested sludge, primary effluent and a mixture of primary and secondary effluent. Dry weather flow from the Los Angeles River was also selected because of the past practice of discharging industrial wastes into the river. It was found that under aerobic conditions with seawater salinity, trace metals were observed to be released from suspended particulates. Release occurred in two stages, an initial rapid release, followed by a slower, long-term release. Release of trace metals may be attributed to oxidation of organic matter or metal sulfides, desorption from suspended solids which depend mostly on dilution ratio and pH of seawater, and formation of metal chloride as well as organo-metallic complexes. (Coyle-Wisconsin)
W78-03069

AERIAL INPUT OF HEAVY METALS INTO AN AQUATIC ECOSYSTEM,
Greenfield, Attaway and Tyler, Inc., San Rafael, CA.
T. Peyton, A. McIntosh, V. Anderson, and K. Yost.
Water, Air, and Soil Pollution, Vol. 5, No. 4, p 443-451, June, 1976. 3 fig, 4 tab, 12 ref. NSF-RANN GI-35106; NIEHS 5TOLRL00064.

Descriptors: *Heavy metals, *Water pollution sources, *Highway effects, *Industrial wastes, *Fallout, *Borrow pits, Indiana, Trace elements, Winds, Water pollution, *Air pollution effects, Steel, Lead, Cadmium, Iron, Zinc, Ponds, Artificial lakes, Gary(IN), Shidler Pond(IN), Automotive exhaust, Aerial input.

Monitoring of a rural pond and a water-filled 'borrow pit' (a place from which highway construction materials were dug) showed that aerial deposit of zinc, cadmium, lead, and iron was significantly greater in the urban pit than at the rural site. Shidler Pond in west-central Indiana, was chosen as an uncontaminated rural site. The borrow pit in an industrialized part of Gary (IN), filled with water soon after is was created in 1954; it has a surface area of 7.8 acres and a center depth of 8.5 m. It is located 1.5-3.5 km southeast of a major steel processing complex, and 40 m south of the Indiana Toll Road. Two floating fallout collectors were placed at northern and southern positions on the water surface. Soil samples were collected in August-September 1973 at Zone A, the southern shore of the pit representing background regional air polluton fallout; Zone B on the northwestern shore receiving regional fallout plus local automotive input; and Zonc C on the northeastern shore, subject to regional fallout, local automotive input, and direct toll road drainage from six drains emptying 10-20 m for the pit's northern shore. In Zone B and C high metal levels, especially lead, were noted near the road, decreasing further from the highway. High levels around the drains indicated likely runoff contamination of the pit. Automotive exhaust impact occurs mainly on land near the road, not on the water surface. Of total sediment deposits in the pit, aerial sources accounted for 69% of cadmium, 48% of zinc, 36% of lead, and 18% of iron. (Lynch-Wisconsin)
W78-03074

THE DETERMINATION OF DIFFERENT FORMS OF METAL IONS IN NATURAL WATERS, (IN RUSSIAN),
Akademiya Nauk URSR, Kiev. Inst. Hidrobiologii.
For primary bibliographic entry see Field 5A.
W78-03075

A BIBLIOGRAPHY ON OCEAN WASTE DISPOSAL, SECOND EDITION,
Interstate Electronics Corp., Anaheim, CA. Environmental Engineering Div.
For primary bibliographic entry see Field 5E.
W78-03087

WATER RESOURCES RESEARCH PROGRAM. TRANSPORT AND DISPERSION OF OIL-REFINERY WASTES IN THE COASTAL WATERS OF SOUTHWESTERN LAKE MICHIGAN (EXPERIMENTAL DESIGN--SINKING-PLUME CONDITION),
Argonne National Lab., IL. Energy and Environmental Systems Div.
D. L. McCown, W. Harrison, and W. Orvosh.
Available from the National Technical Information Service, Springfield, VA 22161 as ANL WR 76-4, Price codes: A04 in paper copy, A01 in microfiche. Report No. ANL/WR-76-4, prepared for U.S. Energy Research and Development Administration, July 1976. 51 p, 8 fig, 3 tab, 9 ref, append. EPA-D6-E681.

Descriptors: *Oil wastes, *Lake Michigan, *Coasts, *Water pollution control, *Transport, Mathematical models, Dispersion, Methodology, Oil refinery wastes, Sinking plumes.

The field phase of the experimental design was implemented on February 14-16, 1976, and consisted of (1) tagging 170 l of simulated refinery waste with 1.4 kg of a 50% acid solution of dysprosium acetate and spreading the tagged waste on the water surface at the entrance to the Indiana Harbor Canal (IHC); (2) tagging 3600 sq. m of water at the IHC mouth with 13.6 kg of samarium complexed with DTPA; (3) sampling the surface and subsurface waters of the lake downflow for 10 km using three boats with submersible pumping systems; and (4) sampling raw-water from the shore and Dunne Crib intakes at Chicago's South Water Filtration Plant (SWFP). The laboratory portion of the experimental design involved neutron activation analysis of the samples after evaporation of the water phase. Reactors and low-energy, photon spectrometers at Argonne and Ames, Iowa were used for sample irradiation and counting. Results indicate that the methodology, with appropriate changes, can be used successfully to study the transport and dispersion of simulated refinery waste injected into the IHC's sinking plume. Deficiencies in the original experimental design are discussed, and recommendations are given for their remedy. More-frequent sampling at the SWFP, and the use of an underway water-sampling system that will permit sampling coverage farther offshore, are the principal improvements required for the 1976/1977, full-scale, sinking-plume study. (Sinha-OEIS)
W78-03092

IMPLICATIONS OF THE U.S. COAST GUARD SEGREGATED BALLAST RETROFIT RULING ON IMPORT ALTERNATIVES AND POLLUTION OF THE MARINE ENVIRONMENT,
Operations Research, Inc., Silver Spring, MD.
For primary bibliographic entry see Field 5G.
W78-03099

PROBABILISTIC TRAJECTORY ASSESSMENTS FOR OFFSHORE OIL SPILLS IMPACTING LONG ISLAND,
Massachusetts Inst. of Tech., Cambridge.
R. J. Stewart, and J. W. Devanney, III.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-263 013, Price codes: A03 in paper copy, A01 in microfiche. Report to Nassau-Suffolk Planning Board, New York, Regional Marine Resources Council, November 15, 1974. 36 p, 9 fig.

Descriptors: *Oil spills, *Oil pollution, *Water pollution sources, *Winds, *Ocean currents, New England, New York, Beaches, Coasts, Seasonal, Ocean circulation, Environmental effects, Outer Continental Shelf, Long Island, Nantucket Shoals, Wind fields, Trajectories.

Under the presumed current and wind fields, this study has shown that it is reasonable for Long Island to anticipate that some spills from the Nantucket Shoals region will beach upon her shores given a sufficient number of such events. In particular, it appears that the probability of a spill beaching on Long Island given that it originated on Nantucket Shoals is on the order of .05 in the summer and perhaps .01 or less in the winter. The times to shore for spills from this area appear to be in the thirty- to forty-day range on the average, and the minimum is around twenty days. These predictions are somewhat at variance with previous results, but this can be explained by the differences in the wind field specifications. (Sinha-OEIS)
W78-03100

AN ESTIMATE OF THE INFLUENCE OF SEDIMENT CONCENTRATION AND TYPE ON REMOTE SENSING PENETRATION DEPTH FOR VARIOUS COASTAL WATERS,
National Aeronautics and Space Administration, Langley Station, VA. Langley Research Center.
For primary bibliographic entry see Field 5A.
W78-03102

A COMPUTER ANALYSIS OF THE SPREAD OF POLLUTION ON LONG ISLAND BEACHES,
Brookhaven National Lab., Upton, NY. Dept. of Applied Science.
A. G. Tingle.
Available from the National Technical Information Service, Springfield, VA 22161 as BNL-50651, Price codes: A02 in paper copy, A01 in microfiche. Report No BNL 50651, Environmental Control Technology and Earth Sciences Report No TID-4500 to Energy Research and Development Administration, July 1976. 21 p, 7 fig, 3 tab. ERDA-EY-76-C-02-0016.

Descriptors: *Water pollution sources, *Winds, *Waste disposal, Garbage dumps, Sewage disposal, New York, *Outer Continental Shelf, *Ocean dumping, New York Bight Apex, Long Island.

In June 1976 large quantities of garbage and sewage-type debris were washed ashore on most southern Long Island beaches. The flotable debris, of unknown source, threatened industry and public health. In an effort to trace the source, the trajectories of floatables from a variety of hypothetical release points in the New York Bight were simulated using a one-layer ocean model that computes currents, given the bottom topography and the observed winds. It was then assumed that the surface material moves as the vector sum of the currents and 3% of the wind. It was found that the initial beaching was probably due to debris floating in the Bight Apex, and that material from as far south as Atlantic City could have washed ashore during late June. An examination of historical wind records indicated that the persistent southwest winds observed during this period could recur about each three years. (Sinha-OEIS)
W78-03103

BASELINE STUDY PROGRAM, NORTH PUGET SOUND. BIOLOGICAL OIL IMPACT LITERATURE REVIEW: VOL I - TEXT,
Beak Consultants Inc., Portland, OR.
For primary bibliographic entry see Field 5C.
W78-03104

OIL SPILL IDENTIFICATION BIBLIOGRAPHY,
Coast Guard Research and Development Center, Groton, CT.
For primary bibliographic entry see Field 5A.
W78-03105

MOVEMENT OF SPILLED OIL OVER THE BEAUFORT SEA SHELF - A FORECAST,
Coast Guard Research and Development Center, Groton, CT.
G. L. Hufford, I. M. Lissauer, and J. P. Welsh.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A033 580, Price codes: A05 in paper copy, A01 in microfiche. Coast Guard Research and Development Center Report No. CG-D-101-76, June 1976. 90 p, 49 fig, 14 tab, 36 ref, append. Also prepared for and sponsored by the Bureau of Land Management.

Descriptors: *Alaska, *Oil spills, *Water quality control, *Water pollution, Forecasting, Meteorology, Path of pollutants, *Outer Continental Shelf, *Beaufort Sea, Environmental conditions, Environmental impact.

Projections of the movement of oil slicks and their impact location along the north Alaskan coast are determined from fifteen potential oil drilling sites. Two approaches are implemented to determine impact locations. The first is a description of the environment with emphasis on the meteorology and water movement in the area. The second considers the interactions of the environmental processes in forecasting the potential paths of spilled oil and their impact location on the shoreline. (Sinha-OEIS)
W78-03108

A NUMERICAL OIL TRAJECTORY FORECAST MODEL USED TO ASSESS THE HAZARD TO LONG ISLAND BEACHES FROM OIL ENTERING THE NEW YORK BIGHT APEX FROM FEBRUARY 11-24, 1977,
Brookhaven National Lab., Upton, NY. Dept. of Applied Science.
A. G. Tingle, and D. A. Dieterle.
Available from the National Technical Information Service, Springfield, VA 22161 as BNL 50649, Price codes: A03 in paper copy, A01 in microfiche. Report No. BNL 50649 and Environmental Control Technology and Earth Sciences Report No. TID-4500, March 1977. 26 p, 13 fig. ERDA- EY-76-C-03-0016.

Descriptors: *Oil spills, *Hazards, *Water pollution effects, Forecasting, Oil pollution, *Outer Continental Shelf, *New York Bight, Long Island.

Oil spilling into the Hudson River from a grounded barge (carrying 400,000 gallons) was observed entering the N.Y. Bight Apex on 11 February 1977. A computer model was used to forecast the subsequent trajectory of this oil and to assess the hazard to Long Island beaches. Oil was forecast to wash ashore on the 13th on Rockaway or Long Beach, depending upon the initial position of the oil in the Bight. Oil was observed on Rockaway Beach on the 13th. Additional daily forecasts indicated no further hazard to Long Island, also in accordance with observations, and the forecasts were terminated on the 16th. The model was used also to assess a beaching event that occurred a week later. The complete calculations are available on microfiche in graphics format. (Sinha-OEIS)
W78-03109

ANALYSIS OF OIL SPILL TRENDS,
GKY and Associates, Alexandria, VA.
G. K. Young, D. Evans, and R. U. Jettmar.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-260 917, Price codes: A03 in paper copy, A01 in microfiche. Report to Counciloon Environmental Quality, Washington, DC, and Environmental Protection Agency, Washington, DC, August 15, 1976. 50 p, 8 fig, 6 tab, 18 ref, 3 append. EQ6AC014.

Descriptors: *Oil spills, *Water pollution, *Statistics, Resources development, Transportation, *Outer Continental Shelf.

An analysis is given of national data on oil spills and cleanup to derive trends from incidents recorded from 1972 through 1975 in the Pollution Incident Reporting System (PIRS) file of the U.S. Coast Guard and the Spill Prevention, Control, and Countermeasure (SPCC) file of the Environmental Protection Agency. Indications are that some improvement trends appear to be present. Future analyses should add credibility to the estimates as information is accumulated in the data files in later years. Future analysis will be greatly benefited by the ability to merge and analyze both the SPCC and PIRS files, as is done in this report. (Sinha-OEIS)
W78-03112

WATER QUALITY OF SELECTED STREAMS IN THE COAL AREA OF SOUTHEASTERN MONTANA,
Geological Survey, Helena, MT. Water Resources Div.
J. R. Knapton, and P. W. McKinley.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-273 028, Price codes: A08 in paper copy, A01 in microfiche. Water-Resources Investigations 77-80, September 1977. 145 p, 53 fig, 1 tab, 13 ref.

Descriptors: *Water quality, *Streams, *Montana, *Coal mines, *Chemical analysis, Anions, Cations, Dissolved solids, Specific conductivity, Trace elements, Sediment transport, Water temperature, Path of pollutants, Water utilization, Irrigation, Cattle, Water analysis, Evaluation, Southeastern Montana.

This report summarizes and evaluates water-quality data collected at 35 stream sites the the coal region of southeastern Montana. Sarpy Creek, Armells Creek, and Rosebud Creek sometimes have dissolved-solids concentrations that cause water to be marginal for agricultural purposes. At times of rainfall and snowmelt, the runoff water mixes with the base-flow component to improve the overall quality. Water in the Tongue River generally showed a downstream degradation in which some changes were related to lithology of the aquifers contributing water to streamflow. Water from Pumpkin Creek and Mizpah Creek is used mostly for cattle watering. To some extent water is used for irrigation although the salinity hazard was often high. The chemical quality of the Powder River changed little during flow downstream. High sediment loads of the river acted as transporting agents for many of the plant nutrients and trace-element constituents. (Woodard-USGS)
W78-03121

HYDROLOGIC MONITORING OF A WASTE-INJECTION WELL NEAR MILTON, FLORIDA, JUNE 1975 - DECEMBER 1976,
Geological Survey, Tallahassee, FL. Water Resources Div.
C. A. Pascale, and J. B. Martin.
Open-file report 77-368, April 1977. 46 p, 9 fig, 4 tab, 16 ref.

Descriptors: *Waste disposal wells, *Injection wells, *Industrial wastes, *Path of pollutants, *Chemical analysis, Sampling, Monitoring, Data collections, Florida, Evaluation, Santa Rosa County(Fla).

Hydraulic and chemical data were collected through a monitoring program conducted by the U.S. Geological Survey at an industrial liquid-

waste injection site 6 mi southwest of Milton, Fla., in Santa Rosa County. The injection system is described. Data include injection rates, volumes, and pressures; water-level data at three monitor wells and a standby injection well, and field and laboratory analyses of water samples from four wells. Hydraulic and geochemical effects of the waste-injection system at the plant as of December 31, 1976, have been detected only in the injection zone, the lower limestone of the Floridan aquifer. Increased pressures are evident at the three wells used to monitor the injection zone. Geochemical changes have been noted only at the deep-test monitor well closest to the injection well. (Woodard-USGS)
W78-03126

PRELIMINARY STUDY OF SOURCES AND PROCESSES OF ENRICHMENT OF MANGANESE IN WATER FROM UNIVERSITY OF RHODE ISLAND SUPPLY WELLS,
Geological Survey, Boston, MA. Water Resources Div.; and Geological Survey, Providence, RI. Water Resources Div.
W. D. Silvey, and H. E. Johnston.
Open-file report 77-561, May 1977. 33 p, 12 fig, 4 tab, 10 ref.

Descriptors: *Manganese, *Water pollution sources, *Groundwater, *Water wells, Ponds, Bottom sediments, Organic matter, Seepage, Iron, Path of pollutants, Groundwater movement, Chemical reactions.

Concentrations of dissolved manganese have increased from 0.0 to as much as 3.3 mg/liter over a period of years in closely spaced University of Rhode Island supply wells. The wells tap stratified glacial deposits and derive part of their water from infiltration from a nearby river-pond system. The principal sources of the manganese seem to be coatings of oxides and other forms of manganese on granular aquifer materials and organic-rich sediments on the bottom of the pond and river. Chemical analyses of water from an observation well screened from 3 to 5 feet below the pond bottom indicate that infiltration of water through organic-rich sediments on the pond bottom is the likely cause of manganese enrichment in the well supplies. After passing through the organic layer, the water contains concentrations of manganese as high as 1.2 mg/liter. Manganese in water in concentrations that do not cause unpleasant taste is not regarded to be toxicologically significant. However, concentrations in excess of a few tenths of a milligram per liter are undesirable in public supplies and in many industrial supplies. Brown and others (21970) note that waters containing manganese in concentrations less than 0.1 mg/liter seldom prove troublesome, but that those containing more than 0.5 mg/liter may form objectionable deposits on cooked food, laundry, and plumbing fixtures. The U.S. Public health Service (1962) recommends that the concentrations of manganese in drinking and culinary water not exceed 0.05 mg/liter. (Woodard-USGS)
W78-03127

TIME OF TRAVEL OF SOLUTES IN THE TUSCARAWAS RIVER BASIN, OHIO, AUGUST AND SEPTEMBER, 1974,
Geological Survey, Columbus, OH. Water Resources Div.
A. O. Westfall, and E. E. Webber.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-273 187, Price codes: A02 in paper copy, A01 in microfiche. Water-Resources Investigations 77-23, March 1977. 7 p, 2 fig, 1 tab, 7 ref.

Descriptors: *Streamflow, *Flow characteristics, *Dye releases, *Travel time, *Pollutants, Ohio, Tracking techniques, Fluorescent dye, Flow rates, Discharge measurement, Data collections, Sampling, Maps, Hydrographs, *Path of pollutants, *Tuscarawas River basin(Ohio).

A time-of-travel study was made on a 106-mile reach of the Tuscarawas River in Ohio to determine average velocity and dispersion characteristics between selected points. The reach was divided into five subreaches, and a fluorescent dye was used as the tracer material. At about the 50-percent flow-duration level, time of travel of the peak concentrations was 137 hours. (Woodard-USGS)
W78-03131

TIME OF TRAVEL OF SOLUTES IN SELECTED REACHES OF THE SANDUSKY RIVER BASIN, OHIO, 1972 AND 1973,
Geological Survey, Columbus, OH. Water Resources Div.
A. O. Westfall.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-273 109, Price codes: A04 in paper copy, A01 in microfiche. Water-Resources Investigations 76-50, October 1976. 64 p, 47 fig, 4 tab, 8 ref.

Descriptors: *Streamflow, *Flow characteristics, *Dye releases, *Travel time, *Pollutants, Ohio, Tracking techniques, Fluorescent dye, Reservoir releases, Flow rates, Discharge measurement, Data collections, Sampling, Maps, Hydrographs, *Sandusky River basin(Ohio).

A time-of-travel study in Ohio of a 106-mile reach of the Sandusky River and a 39-mile reach of Tymochtee Creek was made to determine the time required for water released from Killdeer Reservoir on Tymochtee Creek to reach selected downstream points. Two dye sample runs were made through each subreach to define the time-discharge relation for approximating travel times at selected discharges within the measured range. Time-discharge graphs are presented for 38 subreaches. Graphs of dye dispersion and variation in relation to time are given for three sampling sites. For estimating travel time and velocities between points in the study reach, tables for selected flow durations are given. Duration curves of daily discharge for four index stations are presented to indicate the low-flow characteristics and for use in shaping downward extensions of the time-discharge curves. (Woodard-USGS)
W78-03132

TRACE METALS IN FINFISH FROM THE NEW YORK BIGHT AND LONG ISLAND SOUND,
National Marine Fisheries Service, Milford, CT. Milford Lab.
R. A. Greig, and D. R. Wenzloff.
Marine Pollution Bulletin, Vol 8, No 9, p 198-200, 1 fig, 1 tab, 7 ref. Sept. 1977.

Descriptors: Environmental effects, *Water pollution sources, *Metals, Fish, *New York Bight, *Long Island Sound, Silver, Cadmium, Chromium, Copper, Mercury, Manganese, Nickel, Lead, Zinc, Toxicity, *Trace elements, Trace metals.

Silver, cadmium, chromium, copper, mercury, manganese, nickel, lead and zinc concentrations were determined in five species of finfish (red hake, smooth dogfish, white hake, winter flounder, and yellowtail flounder). Tissue concentrations of the metals were found to be similar in the various species except that zinc in the liver of smooth dogfish was about 10% lower than in red hake or winter flounder and mercury level in a single dogfish liver was 2.0 ppm compared to less than 0.2 ppm in livers of other fish. Metal concentrations were also found to be similar for a single species when comparing catch locations. Comparison of the present data to those of other investigators is made. (Chilton-ORNL)
W78-03139

REGIONAL GEOCHEMICAL DATA IN RELATION TO SEASONAL VARIATIONS IN WATER QUALITY,
Imperial Coll. of Science and Technology, London (England). Applied Geochemistry Research Group.
S. R. Arston, and I. Thornton.
The Science of the Total Environment, Vol. 7, No. 3, p 247-260, 2 fig, 8 tab, 5 ref. 1977.

Descriptors: *Water pollution sources, Water quality, *Geochemistry, *Seasonal, Iron, Manganese, Copper, Lead, Zinc, Cadmium, Sediments, *Metals, *Trace elements, Path of pollutants, *England(Cornwall), Regional analysis, Data collections.

During the period March, 1973 to March, 1974 the concentration of iron, manganese, copper, lead, zinc and cadmium were determined in the waters and sediments of eight tributaries in four Cornish catchments. Considerable variation in the concentrations of all the trace elements occurred on a temporal basis. The greatest range of concentration variations occurred in the mineralized/mined tributaries. The data suggests that the average composition of sediment is useful for the prediction of areas where concentrations of potentially toxic elements in waters may exceed recommended limits. (Chilton-ORNL)
W78-03140

UPTAKE AND ACCUMULATION OF THE NICKEL ION BY MYTILUS EDULIS,
San Francisco Univ., CA. Dept. of Biology.
For primary bibliographic entry see Field 5C.
W78-03142

LEAD IN DRINKING WATER IN SOFT WATER AREAS -- HEALTH HAZARDS,
Glasgow Univ., Glasgow (Scotland). Dept. of Materia Medica.
M. R. Moore.
The Science of the Total Environment, Vol 7, No 2, p 109-115, 2 fig, 2 tab, 20 ref. 1977.

Descriptors: Environmental effects, *Water pollution effects, Plumbing, *Potable water, Toxicity, *Lead, *Public health, Absorption.

The paper reports upon the uptake of lead into domestic water and the association of blood lead concentrations found in persons resident in houses supplied with such water. In situations where a lead-lined storage tank supplied water to a house through lead piping, the initial sample showed a concentration of 2.88 microM which dropped to 0.50 microM when flushed for 5 min at a rate of 10 l/min. In a house plumbed with copper joined with lead soldered joints, the initial figure was 0.51 microM and fell rapidly to 0.12 microM on flushing. Significant regressions were found between water lead and blood lead concentrations of persons resident in these houses. It is suggested that the amount of lead in drinking water can be reduced by removing lead from plumbing systems and a short term solution (already initiated in Glasgow) is to treat the water supply in holding reservoirs with calcium salts as lime at the rate of 2-4 ppm. (Chilton-ORNL)
W78-03143

ASPECTS OF THE VIRAL CONTAMINATION OF SEA WATER: PRELIMINARY RESULTS, (IN ITALIAN),
Messina Univ. (Italy). Inst. of Hygiene.
R. De Blasi, L. Squeri, W. Farina, and I. Picerno.
Riv Ital Ig 36(1-3), p 26-32, 1976.

Descriptors: *Viruses, Sea water, *Water pollution sources, Isolation, Cytological studies, Adenoviruses, Infection, *Messina coast(Italy), Picornaviruses, Polioviruses, Sewage(Untreated).

Sea water samples collected along the Messina (Italy) coast were studied to accertain the degree of viral contamination due to untreated sewage of the city and the villages. The results of cytopathic agents isolated in June, just before the swimming period, are reported. From 82 sea water samples collected, 20 viruses were isolated; 4 of them were polioviruses type I, 1 poliovirus type 3, 8 adenoviruses and 6 not identified. The danger of sea water as a vehicle of infection and necessity of a sewage treatment are discussed. --Copyright 1978, Biological Abstracts, Inc.
W78-03147

TUNICATE SPECIES AS MARINE POLLUTION INDICATORS,
Democritus Nuclear Research Center, Athens (Greece). Chemistry Dept.
C. Papadopoulou, and G. D. Kanias.
Marine Pollution Bulletin, Vol 8, No 10, October 1977, p 229-231, 3 tab, 21 ref.

Descriptors: Environmental effects, *Water pollution sources, *Bioindicators, Aquatic life, Iron, Selenium, Chromium, Zinc, Cobalt, *Tunicates, Microcosmus sulcatus, Ciona intestinalis.

Cobalt, zinc, chromium, caesium, silver, iron, rubidium, selenium, scadium and antimony concentrations were determined in two tunicates, Microcosmus sulcatus (Pyuridae) and Ciona intestinalis (Cionidae). High K values found for the elements selenium, chromium, zinc and cobalt in Microcosmus and of iron in Ciona indicate the usefulness of these two species as indicator organisms to detect or measure the specific pollutants in the environment. (chilton-ORNL)
W78-03148

5C. Effects Of Pollution

THE UPTAKE OF THE MOLLUSCICIDE, 4'-CHLORONICOTINANILIDE INTO BIOMPHALARIA GLABRATA (SAY) IN A FLOWING WATER SYSTEM,
Centre for Overseas Pest Research, London (England).
J. Duncan, N. Brown, and R. W. Dunlap.
Pesticide Science, Vol 8, p 345-353, 1977. 7 fig, 1 tab, 9 ref.

Descriptors: *Pesticides, *Chlorinated hydrocarbon pesticides, *Mollusks, *Methodology, *Design, *Snails, *Flow system, Research and development, Metabolism, Toxicity, Absorption, Analytical techniques, Aquaria, Organic compounds, Bioassay, Methodology, Biomphalaria glabrata, 4'-chloronicotinanilide, Bioaccumulation.

A system was described for the exposure of freshwater snails to pesticides in flowing water. The method allowed groups of seven snails to be confined in about 20 ml of water under constant conditions of pesticide concentration, oxygen tension and temperature for up to 5 days. The uptake rate of 4'-chloronicotinanilide into the planorbid snail, Biomphalaria glabrata (Say) was measured using this method with liquid scintillation counting techniques. The necessity for an acclimatisation period prior to exposure and the possible influence of activity on uptake was demonstrated. The advantages of the flowing system over exposure in static solutions were discussed and the use of the apparatus in deciding whether relative uptake rates can account for interspecific differences in susceptibility or contribute to the improvement of molluscicide specificity was indicated. (Klein)
W78-02702

TOXICITY EVALUATION OF A COMPLEX METAL MIXTURE TO THE SOFTSHELL CLAM MYA ARENARIA,
Environmental Research Lab., Narragansett, RI.
R. Eisler.
Marine Biology, 43, p 265-276, (1977), 7 tab, 7 fig, 20 ref.

Descriptors: *Clams, *Bioassay, Mortality, *Metals, Water pollution effects, *Manganese, *Zinc, *Lead, *Nickel, *Copper, *Cadmium, Rhode Island, Molluscs, Benthos, Methodology, Dredging, Seawater, Softshell clam, Mya arenaria, Salt mixture, Tissue concentration, Bioaccumulation, Narragansett Bay, Metal mixture.

Adults of the softshell clam Mya arenaria were continuously subjected to a flowing raw seawater solution containing a mixture of salts of manganese, zinc, lead, nickel, copper, and cadmium. Final calculated concentrations, in microg 1-1, of the toxicant solution were 7200 Mn, 2500 Zn, 70 Pb, 50 Ni, 50 Cu and 1 Cd. M. arenaria were also subjected to a 20% solution, i.e., 1440 Mn, 500 Zn, 14 Pb, 10 Ni, 10 Cu, and 0.2 microg 1-1 Cd. In the winter study, all clams exposed to a 100% solution died between the 4th and 10th week; soft parts of survivors at 6 weeks contained about 19 times more Pb, 15 x more Zn, 12 x more Cu, 10 x more Mn, 3 x more Ni and 0.1 x more Cd than controls; relatively minor changes in whole body elemental content of Ca, Cr, Fe, K, Mg, Na, Sr, and V were observed. Clams exposed to a 20% solution during winter survived the 112 day study; at that time these contained about 5 x more Cu, 4 x more Mn, 3 x more Zn, and about 2 x more Pb than controls; comparatively minor changes were observed in other elements examined 6 and 14 days; survivors from this group at 7 days contained about 25 x more Pb, 13 x more Cu, 11 x more Zn, 7 x more Mn, and 3 x more Ni than controls; other changes in elemental content were not as pronounced. Mortality in the 20% group during summer was slightly higher than controls during the 16 day study; at 14 days survivors from this group contained about 12 x more Mn, 7 x more Pb, 7 x more Zn, 4 x more Cu, and 3 x more Ni than controls. (Katz)
W78-02703

EFFECTS OF OIL ON BEHAVIORAL RESPONSES TO LIGHT, PRESSURE AND GRAVITY IN LARVAE OF THE ROCK CRAB CANCER IRRORATUS,
Environmental Research Lab., Narragansett, RI.
T. E. Bigford.
Marine Biology, Vol 43, 1977, p 137-148. 1 fig, 8 tab, 26 ref.

Descriptors: *Oil, *Oil pollution, Water pollution effects, *Bioassay, Methodology, Laboratory tests, *Crabs, Crustaceans, *Zooplankton, Animal behavior, Larvae, Gravity, Light, Pressure, *Rock crab, Cancer, No. 2 Fuel Oil, Water accomodated fractions, Larval behavior.

Cancer irroratus larvae were cultured and studied in 0.0, 0.1, 1.0 ppm concentrations of water-accomodated fractions of No. 2 fuel oil under static conditions. Behavioral changes were monitored in terms of water column responses to various conditions of light, pressure, and gravity. Results showed significant effects of this oil fraction on larval behavior, with the specific response to oil depending upon the concentration, larval stage, and the combination of light, pressure and gravity tested. Responses at 0.1 ppm differed from those at 1.0 ppm. Geonegative upward movements in the water column were typically depressed in early-stage larvae and enhanced in late-stage larvae after subjection to oils, showing gravity responses to be greatly affected. Phototactic behaviors were significantly changed by the oil and pressure responses were slightly affected. (Katz)
W78-02704

AVOIDANCE OF LOW PH IN SELECTION OF SPAWNING SITES BY BROOK TROUT (SALVELINUS FONTINALIS),
Cornell Univ., Ithaca, NY. Dept. of Natural Resources.
D. W. Johnson, and D. A. Webster.
Journal of the Fisheries Research Board of Canada, 34, 1977, p 2215-2218. 2 tab, 11 ref.

Descriptors: *Brook trout, *Behavior, *Acidity, *Hydrogen ion concentration, *Spawning, Aquiculture, Fish physiology, Fish eggs, *Fish reproduction, Acidic water, Acidity, Adirondacks, Spawning sites, pH discrimination.

Brook trout (Salvelinus fontinalis) show a strong preference for upwelling water in selection of precise spawning sites. Advantage was taken of this behavior in observing discrimination of pH by 48 breeding females. When artificial aquifers delivered ambient (6.7), alkaline (8.0), and acid water (varied at pH 4.0, 4.5, and 5.0 in three trials), females clearly avoided upwellings of pH 4.0 and 4.5 in preference to alkaline and ambient upwelling. Discrimination was not evident at pH 5.0. As natural springs in the Adirondack area are likely to be alkaline, the strong preference of brook trout for alkaline upwelling water for breeking sites assures a satisfactory environment through egg and larval stages for at least this environmental condition. (Katz)
W78-02705

CHLORINATED HYDROCARBONS IN DOVER SOLE MICROSTOMUS PACIFICUS: LOCAL MIGRATIONS AND FIN EROSION,
Southern California Coastal Water Research Project, Avila, CA. Lockheed Center for Marine Research.
D. J. McDermott-Ehrlich.
Fishery Bulletin, Vol 75, No 3, p 513-517, 1977. 1 fig, 2 tab, 17 ref.

Descriptors: *Chlorinated hydrocarbon pesticides, *Organic compounds, *Effluents, *Wastes, *DDT, Marine fish, Discharge(Water), Waste water(Pollution), Demersal fish, Polychlorinated biphenyls, Water quality, Path of pollutants, Fish physiology, Metabolism, Analytical techniques, Environmental effects, Distribution, California, Fish behavior, Water pollution sources, Bioaccumulation, Tissue analysis, Dover sole, Bottom fish, Microstomus pacificus.

Dover sole, Microstomus pacificus, with and without fin erosion collected from the municipal wastewater discharge sites of Los Angeles and Orange counties. While there was a significant difference between the total DDT levels in muscle tissue of the unaffected fish from the two regions, there was no significant regional differences between the muscle DDT levels in the diseased fish. This was consistent with the proposed hypothesis that the Orange County diseased fish had originated at the Los Angeles County discharge site. Comparisons of chlorinated hydrocarbon levels in diseased and unaffected Dover sole from the Palos Verdes discharge site of Los Angeles County indicated (1) DDT levels were significantly higher (P less than 0.05) in Dover sole with fin erosion, and (2) polychlorinated biphenyl levels were higher at the 90% confidence level (P less than 0.10) in diseased Dover sole. (Klein)
W78-02706

DISSOLVED ATMOSPHERIC GAS SUPERSATURATION OF WATER AND THE GAS BUBBLE DISEASE OF FISH,
Environmental Information Services, Inc., Mercer Island, WA.
D. E. Weitkamp, and M. Katz.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-276 122, Price codes: A06 in paper copy, A01 in microfiche. Completion Report, October 1977. 107 p, 1 tab, 195 ref. OWRT W-224(No. 6263)(1).

Descriptors: Supersaturation, *Dissolved gases, *Water pollution effects, *Nitrogen supersaturation, Thermal pollution, Water temperature, Gases, *Literature reviews, Dissolved gas analysis, Post-impoundment, *Columbia River, *Snake River.

The world literature regarding the effects of supersaturated dissolved gases and the related gas bubble disease on fish has been critically reviewed. Interest in this topic has been simulated by the supersaturation of river waters caused by the dams on the Columbia and Snake Rivers and the supersaturation observed in some thermal effluents. A series of episodes of air supersaturated waters and the resulting gas bubble disease in fish hatcheries and other special situations were reported. The external signs of gas bubble disease syndrome in fish larvae and juvenile stages are described. The internal lesions of the disease are also described. Gas bubble disease is related to total dissolved atmospheric gas levels (nitrogen, oxygen, carbon dioxide, argon) and not to nitrogen alone. A critical level of 110% saturation has been proposed for fish confined to waters of one meter or less depth. Studies have shown that at 115% total gas pressures (TGP), in shallow water, mortalities are usually first observed. Fish permitted access to deeper waters, 2.5 meters or greater, can survive supersaturations of 120% TGP for extended periods of time. An increase in water temperature has the effect of decreasing the solubility of dissolved gases, thus resulting in a higher level of supersaturation. Water becomes supersatured with atmospheric gases because of air injection in faulty pumping mechanisms, by spilling at hydroelectric projects, by increases in water temperature of cooling waters at electrical generating facilities and by natural causes particularly those occuring in spring and well waters, geothermal heating, photosynthesis, or warming by solar radiation. Techniques for nitrogen determination and dissolved gas analysis are reviewed.
W78-02707

RESPONSES OF ALGAE AND BACTERIA TO NUTRIENT ADDITIONS IN BOTTLED LAKE WATER,
Tokyo Metropolitan Univ., Tokyo (Japan). Dept. of Biology.
Y. Tezuka, and H. Hayashi.
The Japanese Journal of Limnology, Vol 36, No 4, p131-138, 1975. 6 fig, 2 tab, 23 ref.

Descriptors: *Algae, *Lakes, *Nutrients, *Water quality, *Bacteria, *Primary productivity, Surface waters, Eutrophication, Organic compounds, Growth rates, Productivity, Limiting factors, Environmental effects, Population, Aquatic life, Ecosystems, Physiochemical properties, Metabolism, Nitrogen compounds, Glucose, Nutrient enrichment.

Surface water of lake Yunoko, a small eutrophic lake in central Japan, was bottled, enriched with glucose and/or mineral nutrients, and incubated for five days at the surface layer of that lake. Bacteria reacted promptly to the addition of glucose. When, however, an ample amount of glucose was added to the lake water, certain mineral nutrients, possibly nitrogen, became secondarily limiting to the growth of bacteria. Although mineral nutrients alone stimulated the growth of algae, the stimulatory effect was far greater when both glucose and mineral nutrients were enriched. (Klein)
W78-02708

ON THE BENTHIC COMMUNITY OF YOKKAICHI HARBOR,
Mie Prefectural Univ., Tsu (Japan). Faculty of Fisheries.
T. Iwaki, T. Niihata, M. Naka, and T. Kawahara.
Bulletin of the Faculty of Fisheries of Mie University, No. 3, p 29-40, 1976. 5 fig, 2 tab, 12 ref.

Descriptors: *Benthos, *Benthic fauna, *Sediments, *Harbors, Worms, Gastropods, Nematodes, Water quality, Ecosystems, Biological communities, Speciation, Distribution, Water pollution, Sampling, Mollusks, Ecological distribution, Dominant organisms, *Yokkaichi Harbor(Japan), Nemerteans, Polychaetes.

Benthic animals and bottom sediments were sampled in october, 1975 at 56 stations selected inside and outside Yokkaichi Harbor. Animals collected were nemerteans, nematodes, gastropods, pelecypods, and polychaetes, and the last were dominant. Dominant species of polychaetes was Paraprionospio pinnata, which was living almost everywhere inside and outside the harbor. The second species in dominance was Lumbrineris longifolia which surpassed P. pinnata in dominancy at some area outside the harbor. The third species was Sigambra tentaculata and the fourth Cossura longocirrata. Organic pollution had advanced at the stagnant corner and in the deeps inside the harbor. Southwest corner of the berth had become abiotic where the sediments (mud) contained more than 5 mg S/g dry mud in total sulfide, 35 mg 02/g dry mud in COD, 25 mg C/g dry mud in organic carbon and 12% ignition loss, with four exceptions which did not reach these levels of conditions in two items and one exception in four items. (Klein)
W78-02709

COPPER, MANGANESE, AND CHROMIUM CONCENTRATIONS IN FIVE MACROPHYTES FROM THE DELTA OF RIVER TOCE (NORTHERN ITALY),
Istituto Italiano di Idrobiologia, Pallanza.
R. Baudo, and P. G. Varini.
Memorie dell'Instituto Italiano di Idrobiologia, Vol 33, p 305-324, 1976. 2 fig, 8 tab, 49 ref.

Descriptors: *Metals, *Copper, *Chromium, *Manganese, *Aquatic plants, *Heavy metals, Plant morphology, Plant physiology, Analytical techniques, Sampling, Seeds, Vascular tissues, Plant tissues, Physiochemical properties, Tissue analysis, *Macrophytes, Phragmites communis, Potamogeton crispus, Trapa natans, Lagarosiphon major, Elode canadensis, River Toce delta(Italy).

Five freshwater macrophytes were collected from March, 1974, to February, 1975 in eight sampling stations of the Toce delta, and were analysed for manganese, copper, and chromium. In Phragmites communis seeds showed the highest concentrations of copper and chromium, while manganese was particularly abundant in leaves. Among the submergent macrophytes, Elodea canadensis had a maximum content of heavy metals; Potamogeton crispus showed the minimum concentration of manganese and chromium and Lagarosiphon major was the less rish in copper. Finally, in Trapa natans manganese and chromium were highly concentrated in stems and copper in fruits. (Klein)
W78-02710

CHEMICAL CONTROL OF ZOOTHAMNIUM SP. ON LARVAL MACROBRACHIUM ACANTHURUS,
Texas Parks and Wildlife Dept., Ingram. Heart of Hills Fisheries Research Station.
For primary bibliographic entry see Field 5G.
W78-02711

TEMPERATURE EFFECTS ON PERIODICITY AND EMBRYOLOGY, WITH OBSERVATIONS ON THE POPULATION GENETICS, OF THE AQUACULTURAL ECHINOID HELIOCIDARIS TUBERCULATA,
Sydney Univ. (Australia). School of Biologic Sciences.
C. O'Connor, and J. C. Mulley.
Aquatulture, Vol 12, 1977, p 99-114. 4 tab, 8 fig, 137 ref.

Descriptors: *Aquiculture, *Invertebrates, *Benthos, Reproduction, Water temperature, Thermal pollution, *Thermal stress, Thermal water, *Growth rates, Geographical regions, Commercial shellfish, Water pollution effects, *Sea urchins, *Heliocidaris, Sea urchin roe, Echinoids, *Population genetics, Geographical variations.

The fertilization and development of H. tuberculata, a species producing over 60 g of roe per individual, were studied seasonally at different temperatures. The optimum temperature for both fertilization and development varied from month to month as adult reproductive periodicity, fertility and larval developmental success were related to the seasonal ocean temperature. Observations on the population genetics of H. tuberculata revealed that populations were genetically undifferentiated with no evidence for separate sympatric or allopatric races, subspecies or species which may have been morphologically indistinguishable had they existed. Consequently, geographical variations in reproductive behaviour observed between locations were probably caused, not by genetic differences, but by localized non-genetic adaptation to prevailing temperatures. (Katz)
W78-02712

ECOLOGICAL BUFFER CAPACITY,
Royal Danish School of Pharmacy, Copenhagen.
S. E. Jorgensen, and H. Mejer.
Ecological Modelling, Vol 3, p 39-61, 1977. 6 fig, 10 tab, 20 ref.

Descriptors: *Model studies, *Ecosystems, Theoretical analysis, *Stability, Behavior, Habitats, Research and development, Mass transfer, Environmental effects, Sediments, Phosphate, Detritus, Phytoplankton, Zooplankton, *Buffer capacity, Complexity, Diversity, Energy, Mass flows, Driving functions, *Ecological buffer capacity.

A situation where models of increasing complexity were calibrated to give equal levels of phytoplankton, detritus, and zooplankton was considered. The buffer capacity of the models was found to increase with increasing capacity. It appeared necessary to have a model of a certain complexity to adequately describe a response to changes. The inclusion of the essential mass flows was determined to be important. In shallow lakes when phosphate was considered, the sediments played an essential role. Diversity was considered less suitably related to the buffer capacity than energy. (Klein)
W78-02713

THE RAPID ALGAE TEST - A CONTRIBUTION TO THE MEASUREMENT OF TOXICITY (DER ALGENSCHNELL TEST - EIN BEITRAG ZUR TOXIZITATMESSUNG),
Landesanstalt fuer Wasser und Abfall Nordrhein-Westfalen, Duesseldorf (West Germany).
For primary bibliographic entry see Field 5A.
W78-02714

TOXICITY TOLERANCE STUDIES UTILIZING PERIPHYTON (TOXITOLERANZVERUCHE AN WASSERMOOSEN),
Duisburg Univ. (West Germany). Dept. of Biology.
J. P. Frahm.
Gewasser und Abwasser, No 57/58, p 59-66, 1975. 1 tab, 6 ref.

Descriptors: *Pollutant identification, *Algae, *Phytoplankton, *Bioassay, *Toxicity, Lethal limit, Metals, Iron, Nutrients, Potassium phosphate, *Sulfates, Calcium, *Sodium chloride, Water quality, *Periphyton, *Lethal threshold, Lepodictyum, Leskea, Fissidens, Schistidium, Fontinalis.

A laboratory study was made of the tolerance of five typical species of fresh water phytoplankton to substances found in some waste waters. The species were Leptodictyum riparium, Leskea polycarpa, Fissidens crassipes, Schistidium alpicola, and Fontinalis antipyretica. The test substances were NaCl, Ammonium sulfate, potassium sulfate, calcium phosphate, and ferric sulfate. The toxicity thresholds of these five species to the various ions were determined. (Katz)
W78-02715

HISTOPATHOLOGICAL CHANGES IN FISH ON INTOXICATION WITH HERBICIDES CONTAINING 2-METHYL-4-CHLORPHENOXYACETIC ACID (HISTOPATOLOGICKE ZMENY U RYB PO INTOXIKACI HERBICIDY S OBSAHEM KYSELINY 2-METYL-4-CHLORFENOXYOCTOVE),
Vysoka Skola Veterinarni, Brno (Czechoslovakia).
L. Groch, and Z. Svobodova.
Bulletin VUR11 Vodnany, Vol 13, No 1, January-March 1977, p 26-30. 4 fig, 13 ref. (English summary).

Descriptors: *Freshwater fish, *Herbicides, Fish diseases, *Animal pathology, Toxicity, Bioassay, Fish physiology, *Water pollution effects, Path of pollutants, Rainbo trout, Carp, *Histopathology, 2-methyl-4-chlorophenoxyacetic acid, Kenopur, Bandex, Dikogren, Circulation disorders, *Hematology.

The organs and tissues of fish intoxicated with combined herbicidal preparations (Keropur, Bandex, Dikogren) containing 2-methyl-4-chlorphenoxyacetic acid were subject to histopathological examination. Carp exhibits circulation disorders manifesting themselves as vasodilatation, congestion, and displacement of erythrocytes from the vascular system. In rainbow trout the histopathological changes are mainly related with the disorders if the circulation system. (Katz)
W78-02717

THE POLLUTION OF THE RHINE ZOOCENOSIS BY MERCURY AND BY ORGANOCHLORINE COMPOUNDS (LA POLLUTION DE LA ZOOCENOSE RHENANE PAR LE MERCURE ET LES PRODUITS ORGANOCHLORES),
Institut de Botanique, Strasbourg (France). Lab. de Ecologie Vegetale.
For primary bibliographic entry see Field 5A.
W78-02718

EXPERIMENTAL STUDIES ON THE EFFECTS OF SUBLETHAL CONCENTRATIONS OF IONOGENIC DETERGENTS ON THE ACTIVITIES OF EMBRYOS, LARVAE AND FRY OF RIVULUS CYLINDRACEUS (CYPRINIDONTIDAE, RIVULINAE (EXPERIMENTELLE UNTERSUCHUNGEN AN RIVULUS CYLINDRACEUS (CYPRINIDONTIDAE, RIVULINAE) ZUM EINFLUB SUBLETALER KONZENTRATIONEN IONOGENER DETERGENTIEN AUF EMBRYONON, LARVEN UND JUNGFISCHE),
Hamburg Univ. (West Germany). Inst. fuer Hydrobiologie und Fischereiwissenschaft.
R. Weinberg.
Internationale Revue gesamten Hydrobiologie, Vol 62, No 3, p 371-383, 1977. 5 fig, 5 tab, 19 ref.

Descriptors: *Mortality, *Organic compounds, *Alkylbenzene sulfonates, *Sulfonates, *Detergents, *Toxicity, Environmental effects, Lethal limit, Growth stages, Fish physiology, Fish behavior, Embryonig growth stage, Fry, Freshwater fish, *Rivulus cylindraceus, Bioaccumulation.

Embryos, larvae, and fry of the cyprinidontid Rivulus cylindraceus, subjected to sublethal concentrations of the branched alkyl benzene sulfonate TBS, were investigated with respect to mortality rates, deformities, hatching and activity (frequency of heart pulsation, pectoral fin beating and body movements of the embryos, swimming behavior and activity of larvae and fry. Under optimal environmental conditions, sublethal concentrations seemed to have no effect on an entire larval or young fish stock. Under stressing environmental factors of natural or human origin, such as lack of nutrients, effects on a stock were noted at low sublethal concentrations. (Klein)
W78-02719

EFFECT OF HEATED WATERS ON BIOCENOSIS OF THE MODERATELY POLLUTED NAREW RIVER. GENERAL CONCLUSIONS,
Polish Academy of Sciences, Warsaw. Dept. of Hydrobiology.
Z. Kajak.
Polskie Archiwum Hydrobiologii, Vol 23, No 4, p 555-561, 1976. 3 tab, 6 ref.

Descriptors: *Thermal pollution, *Heated water, *Water temperature, *Water quality, *Effluents, Productivity, Actinomycetes, Bacteria, Sampling, Diatoms, Phytoplankton, E coli, Diptera, Environmental effects, Rivers, Path of pollutants, Biomass, Density, Distribution, Cyanophyta, Aquatic algae, Periphyton, Worms, Speication, Decomposing organic matter, Water pollution, *Narew River(Poland).

The cumulative effect of heating (by 2C) and pollution in a lowland river resulted in a growth of biomass and share of blue-green algae in the phytoplankton with a drop in diatoms, growth in Actinomycetes and Coli index, decline in the number of benthic Chironomidae species, greater fluctuation in Tubificidae number, and increased destructive processes. Heating, itself, possible to observe only on stationary communities, caused a drop in the number of benthic Chironomidae species, an increase in the share of sexually mature Tubificidae and increased fluctuation in their number in time and a slight growth in number of mesoaprobic species in the periphyton. (See W78-02721 thru W78-02726) (Klein)
W78-02720

EFFECTS OF HEATED WATERS ON BIOCENOSIS OF THE MODERATELY POLLUTED NAREW RIVER. MACROBENTHOS,
Polish Academy of Sciences, Warsaw. Dept. of Hydrobiology.
K. Dusoge, and R. J. Wisniewski.
Polskie Archiwum Hydrobiologii, Vol 23, No 4, p 539-554, 1976. 1 fig, 7 tab, 28 ref.

Descriptors: *Thermal pollution, *Heated water, *Effluents, *Water temperature, *Benthos, *Benthic fauna, *Population, Diptera, *Powerplants, Biological communities, Environmental effects, Aquatic life, Distribution, Sewage, Speciation, Water pollution sources, Rivers, Toxicity, Water quality, Density, Productivity, Sampling, Chironomidae, *Narew River(Poland).

The effect of a power station effluent on species composition, dynamics of the density of benthos was investigated in the lowland Narew River. A slight rise of water temperature, not higher than by 2C in summer, was observed in the river downstream the power station. This gave in effect a decrease in the number of various species (especially Chironomidae) in the benthos, an increase of the share of predatory forms in the benthos and increased fluctuations in the numbers of benthic organisms. These changes indicate unfavourable decrease of the stability of benthic communities. Especially marked changes were observed in the sectors of the river under a combined effect of a higher water temperature and contamination of the waters with sewage and industrial effluents. (Klein)
W78-02721

EFFECT OF HEATED WATERS ON A BIOCENOSIS OF THE MODERATELY POLLUTED NAREW RIVER. OLIGOCHAETA,
Polish Academy of Sciences, Warsaw. Dept. of Hydrobiology.
R. J. Wisniewski.
Polskie Archiwum Hydrobiologii, Vol 23, No 4, p 527-538, 1976. 4 fig, 4 tab, 15 ref.

Descriptors: *Thermal pollution, *Heated water, *Water temperature, *Oligochaetes, *Invertebrates, *Worms, Powerplants, Environmental effects, Water quality, Sampling, Water pollution, Biological communities, Population, Benthos, Distribution, Seasonal, Reproduction, Rivers, *Narew River(Poland).

The effects of a power station effluent on the benthic oligochaetes communities were studied in the slightly polluted lowland Narew River. During a slight rise of water temperature in the stream of the river below the power station, not exceeding 2C in the summer time, the periods of an intensive sexual reproduction were accelerated by a few weeks, the ratio of the mature individuals has increased and the rhythm of the recurrence of young individuals in the population was changed. In effect of these changes, large fluctuations in the numbers of Oligochaetes were observed in the heated sector of the river. (Klein)
W78-02722

EFFECT OF HEATED WATERS ON BIOCENOSIS OF THE MODERATELY POLLUTED NAREW RIVER. PERIPHYTON,
Polish Academy of Sciences, Warsaw. Dept. of Hydrobiology.
I. Andrzejczak-Czechowska, and R. J. Wisniewski.
Polskie Archiwum Hydrobiologii, Vol 23, No 4, p 519-526, 1976. 2 fig, 1 tab, 11 ref.

Descriptors: *Thermal pollution, Effluents, *Heated water, *Water temperature, *Biomass, *Algae, *Periphyton, *Diatoms, Aquatic algae, Primary productivity, Population, Water quality, Environmental effects, Powerplants, Water pollution sources, Sampling, Seasonal, Bioindicators, Rivers, *Narew River(Poland).

The effect of heated waters discharged from the power station on the periphyton algae communities was studied in the slightly polluted lowland Narew River. The discharge of heated water caused a rise of temperature in the river waters by about 2C in summer, after mixing up of the discharge waters with the river waters. In the most strongly heated sector of the river a decrease in the density of periphyton algae and in the number of diatoms species was observed as well as an increase in the ratio of the indicator-forms of alpha-mesosaprobity, especially in warm seasons of the year. The decrease in the number of diatoms species and the increase in the ratio of the forms indicating alpha-mesosaprobity were also observed in the summer and autumn in the most strongly polluted sector of the river, downstream below the discharge of the wastes from the sewage treatment plant at Ostroleka. (Klein)
W78-02723

EFFECT OF HEATED WATERS ON BIOCENOSIS OF THE MODERATELY POLLUTED NAREW RIVER. PHYTOPLANKTON,
Polish Academy of Sciences, Warsaw. Dept. of Hydrobiology.
J. Turczynska, and R. J. Wisniewski.
Polskie Archiwum Hydrobiologia, Vol 23, No 4, p 507-518, 1976. 3 fig, 3 tab, 15 ref.

Descriptors: *Thermal pollution, *Phytoplankton, *Productivity, *Primary productivity, *Biomass, *Heated water, *Water temperature, Chlorophyll, Power plants, Distribution, Population, Speciation, Sampling, Seasonal, Cyanophyta, Chlorophyta, Nannoplankton, Rivers, Environmental effects, Water quality, Water pollution, Narew River(Poland).

The effects of a power station on phytoplankton were investigated in the moderately polluted lowland the Narew River. The rise of water temperature did not cause any changes in the species composition, composition of dominants, density and biomass of phytoplankton and pheopigments chlorophyll a ratio. Only in the case of the intake of more than 30% of the river rate of flow for cooling purposes an increase in the ratio of blue-green algae in the total number and biomass of the

phytoplankton was observed in the waters directly below the discharge of the cooling waters. An increase in the number and biomass of blue-green algae was also observed in the sector of the river remaining under combined of heating and pollution, especially at the time of the low water flow rate in the river in summer and autumn of 1973, an increase in the number and biomass of green algae was also observed as well as a strong development of nonnoplanktonic forms in summer 1973. (Klein)
W78-02724

EFFECT OF HEATED WATERS ON BIOCENOSIS OF THE MODERATELY POLLUTED NAREW RIVER. MICROBIOLOGICAL CHARACTERISTICS,
Polish Academy of Sciences, Warsaw. Dept. of Hydrobiology.
W. A. Godlewska-Lipowa.
Polskie Archiwum Hydrobiologii, Vol 23, No 4, p 499-506, 1976. 7 fig, 12 ref.

Descriptors: *Thermal pollution, *Biomass, *Productivity, *Heated water, *Water temperature, *Bacteria, *Actinomyces, *Density, Bioassay, Sampling, Population, Powerplants, Wastes, Bioindicators, Water quality, Water pollution, Water pollution sources, Environmental effects, Microbiology, Humic wastes, Decomposing organic matter, *Cellulolytic bacteria, Fecal pollution, *Narew River(Poland).

Studies on the density and biomass of bacteria, cellulolytic bacteria, and actinomyces were carried out in the 133-km-long sector of the Narew River from Ostroleka down to the Zergrzynski Dam Reservoir. Heterotrophic activity of microflora on cellulose and index of fecal pollution were determined. The number and biomass of bacteria in the Narew River remained, before (1973) and after the setting in motion of the Power-Plant-B at Ostroleka (1973), at a stable level with only very slight oscillations. In 1973 the values of the index of faecal pollution and of actinomyces were slightly higher than in 1972. This refers also to the number and activity of cellulolytic bacteria. The values of the organic matter destruction in 1973 were many times higher than in 1972. It seems that this comes in result of a cumulative effect of a slightly higher water temperature and simultaneous water contamination. (See also W78-02720) (Klein)
W78-02725

EFFECT OF HEATED WATERS ON BIOCENOSIS OF THE MODERATELY POLLUTED NAREW RIVER. PHYSICO-CHEMICAL CONDITIONS,
Institute of Meteorology and Water Economy, Warsaw (Poland). Dept. of Biology and Water Chemistry.
J. R. Dojlido.
Polskie Archiwum Hydrobiologii, Vol 23, No 4, p 487-498, 1976. 5 fig, 3 tab, 6 ref.

Descriptors: *Heated water, *Water temperature, *Effluents, *Water quality, *Power plants, Dissolved oxygen, Physiochemical properties, Water pollution sources, Rivers, *Nitrites, Environmental effects, *Thermal pollution, Waste water(Pollution), Water pollution, Chemical oxygen demand, Biocenosis, *Narew River(Poland).

The effect of heated water discharge from a power plant on the quality of water in the moderately polluted Narew River was investigated. Utilization of the river water for the cooling system requirements ranged up to 40 per cent of the river flow. The rise of temperature of the river water (1.5 km downstress of the power plant) ranged up to 2C. The maximum temperature of the river water was 28.5C. The heated waters did not cause any negative changes in the quality of water. Only a slight decrease in the concentration of dissolved oxygen and biochemical oxygen demand was observed, as well as, a slight increase in the concentration of nitrites. (See also W78-02720) (Klein)
W78-02726

INVESTIGATIONS ON THE UPTAKE OF MERCURY IONS BY CHLORELLA FUSCA AND CHLAMYDOMONAS REINHARDI (UNTERSUCHUNGEN UBER DIE AUFNAHME VON QUECKSILBERIONEN BEI CHLORELLA FUSCA UND CHLAMYDOMONAS REINHARDI),
Oesterreichische Studiengesellschaft fuer Atomenergie G.m.b.H., Vienna.
W. Eisenreich, H. Wihlidal, G. Stehlik, and R. Biebl.
Report OGAE BER. NO. 2456, 13L-139/75, p 1-19, 1975. 18 fig, 1 tab, 22 ref.

Descriptors: *Metals, *Mercury, *Mode of action, *Algae, *Chlorophyta, Chlorella, Chlamydomonas, Radioisotopes, Absorption, Membranes, Transfer, Plant physiology, Path of pollutants, Translocation, Ions, Chlorella fusca, Chlamydomonas reinhardi, Tissue analysis, Bioaccumulation.

The uptake of labelled mercury ions (taken as 203Hg-acetate) was investigated on two different unicellular algae, Chlorella fusca and Chlamydomonas reinhardi. During the first hours of the experiments both organisms, cultivated asynchronously, showed comparatively quick and strong uptakes of mercury ions, being independent of any supply of energy (light, heat). Uptake-tests applied to synchronous algae cell cultures further demonstrated rather independence of the cells' physiological condition. The results suggest a passive transport of mercury ions at Chlorella fusca and Chlamydomonas reinhardi or a strong binding to the cell wall. (Klein)
W78-02727

FATE OF 2,4,-D IN FISH AND BLUE CRABS,
Syracuse Research Corp., NY.
H. C. Sikka.
Available from the National Technical Information Service, Springfield, VA 22161 as ADA-040 678, Price codes: A02 in paper copy, A01 in microfiche. Submitted to Office of Chief of Engineers, U.S. Army, Wash., D.C.. Contract Report A-77-2. May 1977. 18 p, 8 ref, 5 tab.

Descriptors: *Path of pollutants, *Pesticide residues, *Absorption, *2,4-D, *Channel catfish, *Crabs, *Sunfishes, *Herbicides, *Laboratory tests, Aquatic plants, Public health, Metabolism, Shellfish, Crustacean, Pesticides, Chlorinated hydrocarbon pesticides, Commercial shellfish, Bioaccumulation, St. Johns River(Florida).

The uptake and accumulation of the dimethylamine (DMA) salt of 2,4-D by fish and blue crabs was studied in the process of registering the use of this herbicide in slow moving waters for aquatic plant control. Bluegills and channel catfish were exposed to 2,4-D in an environment in which microbial degradation of the herbicide was minimal for assessment of uptake and metabolism. To determine residues of 2,4-D in crab meat, blue crabs were collected from four locations along the St. Johns River in Florida, following treatment of water hyacinths with the 2,4-D DMA. The results of this study demonstrated that the herbicide did not bioaccumulate in fish and did not exceed the established tolerance limit of 1.0 ppm in blue crab flesh. (Katz)
W78-02728

IMPACTS OF POWER PLANT INTAKE VELOCITIES ON FISH,
National Power Plant Team, Ann Arbor, MI.
J. Boreman.
Fish and Wildlife Service, Biological Services Program No. FWS/OBS-76/20.1, March 1977. 10 p. 13 ref, 2 fig, 2 tab.

Descriptors: *Powerplants, *Fishkill, *Intakes, *Entrainment, *Larvae, *Velocity, *Cooling water, Environmental effects, Mortality, Spatial distribution, Design, *Intake velocity, *Powerplant design.

This report outlines biological problems associated with power plant intake velocities. Information needed to assess impacts of intake velocities on fishery resources and a list of technical references containing more detailed analyses of the problems and mitigation alternatives are included. Reduction of entrainment losses can be accomplished by several methods, including use of skimmer walls, velocity caps, and submerged weirs, relocation of the intake in areas of less critical habitat or construction of a closed-cycle cooling system to reduce the volume of water withdrawal. Reduction of impingement can be accomplished by use of methods such as travelling screens, fish bypass systems, louvers, and relocation of the intake. (Katz)
W78-02731

SOME ASPECTS OF BENTHIC PRODUCTION IN A SALMONID REARING CHANNEL,
Fisheries and Marine Service, Nanaimo (British Columbia). Biological Station.
D. D. Williams, J. H. Mundie, and D. E. Mounce.
Journal of the Fisheries Research Board of Canada, Vol. 34, 1977, p 2133-2141. 13 fig, 22 ref.

Descriptors: *Salmon, *Fish hatchery, *Benthic flora, *Benthic fauna, Benthos, Fish diets, Fish establishment, Fish farming, *Aquiculture, Fish population, Invertebrates, Biomass, *Water pollution effects, *Benthic production, *Salmonid rearing channel, Substrate recolonization, *Fish production wastes, Benthic standing crop.

Experiments on optimizing the use of benthos in a salmonid rearing channel are described. The cropping potential of invertebrates for use as fish food was measured by substrate recolonization which showed that 80,000 animals, weighing approximately 0.62 g (dry weight) could be liberated from 1 m2 of clean gravel substrate to a depth of 15 cm every 15 days. Recolonization curves expressed in terms of number of taxa, total numbers, and biomass gave the following patterns: asymptotic regression curve, logistic growth curve, and a straight line, respectively. Individual curves of the major taxa showed a variety of patterns. Small accumulations of fish production wastes (up to 9 1/m2 of food pellets and up to 4.5 1/m2 of fish feces) increased benthic standing crop by as much as 3 times, but larger accumulations resulted in a decline together with a decrease in benthos diversity. We suggest that invertebrates ameliorate these potential pollutants through their feeding and living habits. (Katz)
W78-02733

LONG-TERM TOXIC EFFECTS OF DDT FOOD AND WATER EXPOSURE ON FATHEAD MINNOWS (PIMEPHALES PROMELAS),
Environmental Research Lab., Duluth, MN.
A. W. Jarvinen, M. J. Hoffman, and T. W. Thorslund.
Journal of the Fisheries Research Board of Canada, Vol. 34, 1977, p 2089-2103. 9 tab, 4 fig, 53 ref.

Descriptors: *DDT, *Chlorinated hydrocarbon pesticides, Insecticides, Minnows, *Fish food, Water quality, *Water pollution effects, Bioassay, *Food chain, *Pesticides, Clams, Freshwater fish, Methodology, *Fathead minnows, Pimephales, *Maximum acceptable toxicant concentration.

Fathead minnows were exposed during a partial chronic toxicity test to two DDT concentrations in the water, one in the diet, and combinations of water and diet for 266 days through a reproductive period of their life cycle. The fish were fed a diet of clams that had accumulated 14C-DDT when ex-

posed at a DDT water concentration similar to that in the high fish exposure. Higher total DDT tissue residues were accumulated from the water than diet. Residues contributed by dietary DDT were additive to those from the water. Mean concentrations factors were 1.2 for the diet and 100,000 for the water. Fish exposed to DDT in both water and diet had higher mortality rates than those exposed to only one or the other of these sources. DDT in the diet significantly reduced the probability of survival of the test fish (P=0.025). Estimated maximum acceptable toxicant concentrations for DDT are 9 microg/liter for fish exposed to DDT in both water and diet. Embryo residue levels and larval mortality rates were about twice as great for those from parent fish that had been exposed to DDT in both the water and diet as for those from parent fish exposed to only DDT in the water. (Katz)
W78-02734

MASS STRANDING OF THE LONG-FINNED PILOT WHALE, GLOBICEPHALA MELAENA, ON SABLE ISLAND, NOVA SCOTIA,
Ontario Veterinary Coll., Guelph.
J. R. Geraci, and D. J. St. Aubin.
Journal of the Fisheries Research Board of Canada, Vol. 34, 1977, p 2196-2199. 3 fig, 10 ref.

Descriptors: *Oil, *Oil pollution, *Water pollution effects, *Mammals, Animal pathology, Wildlife, *Mortalities, Atlantic Ocean, *Massachusetts, Canada, *Mass stranding, *Long-finned pilot whales, Canadian Atlantic, *Oil tankers, *Argo Merchant, Globicephala, *Sable Island(NS).

On December 23, 1976, a herd of over 130 long-finned pilot whales, Globicephala melaena, became stranded on Sable Island, Nova Scotia (43 deg 58'N:59 deg 48'W). Data on sex, length, and maximum girth, as well as skin, and blubber samples for eventual hydrocarbon analysis were collected on January 15 and 16 from up to 116 carcasses. The possible reasons for the stranding are discussed. In particular, implications in the news media that the stranding was precipitated by the December 15 breakup of the oil tanker Argo Merchant off the Massachusetts coast are discounted. (Katz)
W78-02735

GROWTH OF ROCK BASS, AMBLOPLITES RUPESTRIS, IN RELATION TO THE MORPHOEDAPHIC INDEX AS AN INDICATOR OF AN ENVIRONMENTAL STRESS,
Toronto Univ. (Ontario). Dept. of Zoology.
For primary bibliographic entry see Field 5A.
W78-02736

BIOELECTRIC ACTION POTENTIALS OF PROCAMBARUS ACUTUS ACUTUS (GIRRARD) IN SERIALLY DILUTED SOLUTIONS OF SELECTED C6 HYDROCARBONS IN WATER,
Marine Biological Lab., Woods Hole, MA.
B. Idoniboye-Obu.
Environmental Pollution, Vol. 14, 1977, p 5-24. 2 tab, 6 fig, 62 ref.

Descriptors: *Oil, *Oil pollution, *Bioassay, Mortality, Laboratory tests, *Methodology, Crustaceans, *Crayfish, Animal physiology, Electric fields, Electrodes, Monitoring, Water pollution effects, Laboratory equipment, Bioelectric action potentials, *Procambarus, *C6 hydrocarbons, *Water soluble fractions, Muscle action potentials, Electrophysiology, Threshold concentrations, Hexane, Hexene, Cyclohexene, Benzene.

Gross muscle action potentials and spontaneous nerve action potentials from moving animals inside experimental chambers or aquaria containing a sufficient depth of water can be recorded by means of remote electrodes. The principle of recording the complex action potentials from both neurogenic and myogenic sources by remote electrodes in water is explored in a bioassay assessing the external concentrations of selected water-soluble petroleum hydrocarbons. These petroleum hydrocarbons could bring about the ultimate cessation of impulse generation and propagation in short term exposures. Long before the harsh threshold of the 'death response' itself is reached, a progressive diminution or irregularity of the biopotentials can indicate proximity to the 'point of no return'. This is particularly so in the locomotor system, which begins to function less and less effectively in decapod Crustacea, commonly known as very active animals. It is suggested that lethal thresholds of water pollution can be established in a systematic manner using test organisms, especially those of commercial importance, by such electrophysiological methods, with minimum destruction of experimental animals. The technique can be adapted or refined for use in regulatory laboratories and similar establishments. (Katz)
W78-02737

ISOLATION OF TRICHODERMA HARZIANUM (RIFAI) GROWING ON FERRIC HYDROXIDE MUD IMPREGNATED WITH GAS OIL,
Societe Francais des Petroles BP, Paris. Div. of Microbiology.
For primary bibliographic entry see Field 5A.
W78-02738

THE EFFECTS OF THE WATER-SOLUBLE FRACTIONS OF NO. 2 FUEL OIL ON THE EARLY DEVELOPMENT OF THE ESTUARINE FISH, FUNDULUS GRANDIS BAIRD AND GIRARD,
Texas A and M Univ., College Station. Dept. of Biology.
V. V. Ernst, and J. M. Neff.
Environmental Pollution, Vol. 14, 1977, p 25-35. 2 tab, 8 fig, 14 ref.

Descriptors: *Oil, *Oil pollution, *Toxicity, Mortality, *Bioassay, Laboratory tests, *Pathology, Juvenile fish, Estuarine environment, *Water pollution effects, *Estuarine fish, Fundulus grandis, *No 2 fuel oil, *Water soluble fractions, Petroleum hydrocarbons, *Naphalenes, *Methylnaphthalenes, *Histological examination, Pathological effects.

Embryos of Fundulus grandis were exposed continuously to 12.5, 25, and 50% dilutions of the water-soluble fraction (W SF) of No. 2 fuel oil, corresponding to aqueous petroleum hydrocarbon concentrations of 1.1, 2.2, and 4.4 ppm, respectively, and aqueous naphthalenes concentrations of 0.56, 1.07, and 1.26 ppm, respectively. At different times during development, embryos were examined histologically and compared with unexposed controls. Embryos exposed to 12.5% WSF generally hatched earlier than the controls and most were normal. Some of those exposed to 25% WSF had pathological liver, kidney, lens, and epithelial tissue while others appeared normal. None of the embryos exposed to 50% WSF hatched and all had pathological tissues. (Katz)
W78-02739

COASTAL WATER RESEARCH PROJECT, ANNUAL REPORT 1975,
Southern California Coastal Water Research Project, El Segundo, CA.
For primary bibliographic entry see Field 2L.
W78-02740

ECOLOGICAL AND DISEASE STUDIES OF DEMERSAL FISHES IN PUGET SOUND NEAR METRO-OPERATED SEWAGE TREATMENT PLANTS AND IN THE DUWAMISH RIVER,
Washington Univ., Seattle. Fisheries Research Inst.
For primary bibliographic entry see Field 5A.
W78-02741

A SELECTED BIBLIOGRAPHY ON RAINBOW TROUT, SALMO GAIRDNERI RICHARDSON, WITH PARTICULAR REFERENCE TO STUDIES WITH AQUATIC TOXICANTS,
Environmental Protection Service, Halifax (Nova Scotia). Environmental Services Branch.
P. Wells.
Economic and Technical Review Report No. EPS-3-AR-77-1. April 1977. 109 p, 599 ref.

Descriptors: *Rainbow trout, *Bibliographies, *Toxins, *Information retrieval, *Bioassay, *Fish diseases, *Fish physiology, *Water pollution effects, Trout, Salmonids, Reviews, Laboratory tests, Toxicity, Pesticides, Metals, Environmental effects, Indexes, *Sublethal effects, *Toxicants.

An indexed and selected bibliography on rainbow trout, Salmo gairdneri Richardson, is presented. It contains 599 references from the primary and technical scientific literature. These references are of particular interest and use to aquatic toxicity laboratories studying the responses of rainbow trout in toxicity bioassays. The references are presented in three sections - holding and disease, physiology and effects of toxicants - and two indexes (author and keyword) are compiled to allow their rapid access. (Katz)
W78-02742

TOXICITY OF TNT WASTEWATER (PINK WATER) TO AQUATIC ORGANISMS,
Stanford Research Inst., Menlo Park, CA.
D. H. W. Liu, R. J. Spanggord, and H. C. Bailey.
Available from the National Technical Information Service Springfield, VA 22161 as ADA-031 067, Price codes: A03 in paper copy, A01 in microfiche. Army Medical Research and Development Command, Washington, D. C., January 1976. 31 p, 8 tab, 9 ref.

Descriptors: Bioassay, *Toxicity, Mortality, *Freshwater fish, Crustaceans, *Daphnia, Hydrogen ion concentration, Industrial wastes, Irradiation, Laboratory tests, Laboratory animals, Acute toxicity, *Alpha-TNT, 2,4-DNT, *TNT wastewater, *Fathead minnow, Pimephales, Static bioassays, Ultraviolet irradiation, Red water, *Benzene.

The acute toxicity was determined of aqueous solutions of alpha-TNT and 2,4-DNT and three types of TNT wastewater from the Joliet Army Ammunition Plant to the fathead minnow (Pimephales promelas) and the aquatic invertebrate Daphnia magna. The toxicity tests were conducted on materials that had been adjusted to pH 5, 7, and 9.4 and exposed to ultraviolet light. All tests were conducted under static conditions without aeration. The pH of the material during irradiation had little effect on its toxicity. Ultraviolet irradiation of LAP and condensate wastewater and of alpha-TNT and 2,4-DNT, the respective major constituents of the two wastewaters, reduced their toxicity; however, this effect was not statistically significant. The acute toxicity of benzene and aqueous fractions of nonirradiated wastewater and of 50% photolyzed aqueous solutions of alpha-TNT and 2,4-DNT was also determined. The benzene fractions were more toxic than the aqueous fractions. Evidence was obtained suggesting that alpha-TNT is probably the most toxic ingredient of LAP wastewater. The minnow and Daphnia magna were equally sensitive to 2,4-DNT, but the latter was more tolerant of alpha-TNT. (Katz)
W78-02743

BIBLIOGRAPHY OF STRIP MINE ECOLOGY,
Iowa State Univ., Ames. Energy and Mineral Resources Research Inst.
For primary bibliographic entry see Field 5G.
W78-02744

SUBMODELS: COPEPOD POPULATION PARAMETERS AS FUNCTION OF ENVIRONMENTAL FACTORS,
Oak Ridge National Lab., TN.
L. A. Maguire, S. R. Blum, C. W. Gehrs, and W. Van Winkle.
Available from the National Technical Information Service, Springfield, VA 22161 as ORNLTM-4978, Price codes: A04 in paper copy, A01 in microfiche. Oak Ridge National Laboratory, Environmental Sciences Division, Publication No. 853, ORNL/TM 4978, July 1976. 58 p, 6 fig, 24 ref.

Descriptors: *Copepods, Zooplankton, *Environmental effects, Water pollution effects, *Model studies, Animal populations, Mortality, *Statistical methods, Statistical models, Water temperature, Analytical methods, *Methodology, Calanoid copepods, *Diaptomus, Population parameters, Environmental factors, *Submodels.

This report describes a set of function submodels that have been developed to calculate copepod population parameters (e.g., clutch size, mortality) as functions of environmental factors (e.g., water temperature, food). Since little is known about how environmental conditions influence copepod population parameters, a variety of functional forms that can be used to relate any population parameter to any environmental factor have been constructed. A brief review of the literature on the calanoid copepod Diaptomus clavipes Schacht and related species suggests functions that may be appropriate for specific biological relationships. (Katz)
W78-02745

DEVELOPMENT OF AN ON-LINE BIOLOGICAL DETECTOR,
Gulf South Research Inst., New Orleans, LA.
For primary bibliographic entry see Field 5A.
W78-02746

THE TOXICITY OF URANIUM AND PLUTONIUM TO THE DEVELOPING EMBRYOS OF FISH,
Oak Ridge National Lab.
J. E. Till, S. V. Kaye, and J. R. Trabalka.
Available from the National Technical Information Service, Springfield, VA 22161 as ORNL-5160, Price codes:A10 in paper copy, A01 in microfiche. Oak Ridge National Laboratory, Report No. ORNL-5160, UC-41 Health and Safety, July 1976. 189 p, 16 tab, 43 fig, 144 ref.

Descriptors: Carp, *Freshwater fish, *Bioassays, Toxicity, Mortality, Laboratory tests, *Fish eggs, Fish reproduction, Metals, *Radioactivity, *Uranium radioisotopes, Fish physiology, Juvenile fish, Animal pathology, *Plutonium, *Uranium, Carp eggs, Pimephales promelas, Egg hatchability.

The radiological and chemical toxicity of plutonium and uranium to the developing embryos of fish was investigated using eggs from carp, Cyprinus carpio, and fathead minnows, Pimephales promelas. Freshly fertilized eggs were developed in solutions containing high specific activity 238Pu or 232U or low specific activity 244Pu, 235U, or 238U. Quantitative tests to determine the penetration of these elements through the chorion indicated that plutonium accumulated in the contents of carp eggs reaching a maximum concentration factor of approximately 3.0 at hatching. Autoradiographs of egg sections showed that plutonium was uniformly distributed in the egg volume. Uranium localized in the yolk material, and the concentration factor in the yolk sac remained constant during development at approximately 3.3. Doses of 238Pu which affected hatchability of the eggs were estimated to be 1.6 x 10 to the 4th rads and 9.7 x 10 to the 3rd rads for c. carpio and P. promelas, respectively; doses from 232U were 1.3 x 10 to the 4th power rads to carp and 5.7 x 10 to the 2nd power rads to fathead minnows; 3.2 x 10 to the 3rd power rads to carp and 2.7 x 10 to the 2nd power rads were estimated from 232U. Eggs that were incubated in 20 ppm 244Pu did not hatch. This mortality may have been the result of chemical toxicity of plutonium. (Katz)
W78-02747

THE POTENTIAL BIOLOGICAL EFFECTS OF DEPLETED URANIUM ON RANGE C-74 UPON THE ALGAL FLORA OF ROCKY CREEK ON EGLIN AIR FORCE BASE,
Alabama Univ., University. Dept. of Biology.
J. C. O'Kelley.
Available from the National Technical Information Service, Springfield, VA 22161 as ADA-040 809, Price codes: A02 in paper copy, A01 in microfiche. Air Force Armament Laboratory, Armament Development and Test Center, Eglin A.F.B., Fla. August 1976. 52 p. 20 ref, 29 tab, 1 fig. AFATL-TR-76-98.

Descriptors: *Toxicity, *Water pollution sources, *Algae, *Uranium radioisotopes, *Environmental effects, *Growth rates, *Streams, Laboratory tests, On-site investigations, Water pollution effects, Dissolved oxygen, Florida, *Rocky Creek(Florida), *Depleted uranium, *Chlorococcum, U308, Eglin Air Force Base.

Stream samples were collected at five time periods between November 1974 and April, 1976, from selected sites on Rocky and Turkey Creeks, Eglin Air Force Base, Florida. Rocky Creek is in a drainage area for some depleted uranium while Turkey Creek is not. The physical parameters of pH, temperatures and dissolved oxygen were measured as the water samples were taken. The algae present in the samples were identified and the algal populations in Rocky Creek were compared to those in Turkey Creek. There is no evidence from this study that there has been any ecological damage done as yet to Rocky Creek by depleted uranium. However, species isolated from this stream have been shown to be sensitive to uranium as U308 and as UO2 and also to uranyl nitrate. These species and presumably others from the stream can be expected to show damage from depleted uranium on the range should its level become sufficiently high to give a concentration in the water of the stream approaching 5 x 10 to the -5th power M. (Katz)
W78-02748

EFFECTS OF WASTEWATER AND COOLING WATER CHLORINATION ON AQUATIC LIFE,
Environmental Research Lab., Duluth, MN.
W. D. Brungs.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-257 700, Price codes: A04 in paper copy, A01 in microfiche. Ecological Research Series, Report No. EPA 600/3-76-098, August 1976. 45 p, 154 ref.

Descriptors: Aquatic animals, Aquatic plants, *Bioassay, *Chlorine, *Chlorination, *Bromine, *Bromides, Condensors, Cooling water, *Fishes, *Reviews, *Toxicity, Standards, Aquatic environment, Cooling towers, *Bromination, *Bromine halides, *Chlorinated organic compounds, *Dechlorination, Disinfection, *Wastewater chlorination, *Criteria, Application factors.

The literature since 1972 pertaining to wastewater and cooling water chlorination is discussed under the following headings: review papers, chlorinated municipal wastewaters, continuously chlorinated water, intermittently chlorinated water, dechlorination, avoidance, formation of chlorinated organic compounds, aquatic life criteria and application factors, and regulations. Field and laboratory research results support a single criterion of 0.003 mg/l for continuous exposure of freshwater organisms. The former distinction between warmwater and coldwater systems is no longer appropriate; recent data indicate that several freshwater fish species are as sensitive as trout and salmon. (Katz)
W78-02749

PHOTODEGRADATION OF ORGANIC MATERIALS USED AS BIOMASS,
Naval Research Lab., Washington, DC.
For primary bibliographic entry see Field 5B.
W78-02751

MICROBIAL METABOLISM OF POLYCHLORINATED BIPHENYLS. STUDIES ON THE RELATIVE DEGRADABILITY OF POLYCHLORINATED BIPHENYL COMPONENTS BY ALKALIGENES SP.,
Wisconsin Univ.-Madison. Dept. of Entomology.
K. Furukawa, and F. Matsumura.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-263 510, Price codes: A02 in paper copy, A01 in microfiche. Sea Grant Reprint No. WIS-SG-76-363,7 p. Reprinted from Journal of Agricultural and Food Chemistry, Vol. 24, p 251-256, March-April 1976. 8 fig, 2 tab, 7 ref.

Descriptors: *Bacteria, *Lakes, Sediments, *Aroclor, *Polychlorinated biphenyl, *Chlorinated hydrocarbon pesticides, Biochemistry, Physiology, Water pollution effects, Microorganisms, Microbial degradation, Environmental effects, *Bacteria, *Alkaligenes, *PCB compounds.

A bacterial strain belonging to the genus Alkaligenes was isolated from a lake sediment by using biphenyl as a sole carbon source. Metabolic degradation of various polychlorinated biphenyls (PCB) by this organism was studied. The bacterium was capable of metabolizing various PCB components, including a highly chlorinated one through an oxidative route. The organism appears to preferentially degrade the less chlorinated (ring II) of the two rings. Degradation takes place in two major steps. The first step produces metabolic intermediates which are considered to be chlorinated derivatives of 2-hydroxy-6-oxo-6-phenylhexa-2,4-dienoic acid, which often has a yellow color with an absorption around 400 nm. In the second step these colored metabolic intermediates are degraded to corresponding chlorobenzoic acids. Generally speaking, degradation of PCBs becomes increasingly difficult as the degree of chlorination increases. (Katz)
W78-02752

PESTICIDE RECOVERY STUDIES FOR EVALUATION OF PEST MANAGEMENT AND PESTICIDE MONITORING DIVISION WATER ANALYSIS METHODOLOGY, JUNE 1974-JUNE 1976,
Army Environmental Hygiene Agency, Aberdeen Proving Ground, MD.
For primary bibliographic entry see Field 5A.
W78-02753

AQUATIC DISPOSAL FIELD INVESTIGATIONS, EATONS NECK DISPOSAL SITE, LONG ISLAND SOUND; APPENDIX E: PREDISPOSAL BASELINE CONDITIONS OF ZOOPLANKTON ASSEMBLAGES,
New York Ocean Science Lab., Montauk.
For primary bibliographic entry see Field 5E.
W78-02784

AQUATIC DISPOSAL FIELD INVESTIGATIONS, EATONS NECK DISPOSAL SITE, LONG ISLAND SOUND; APPENDIX F: PREDISPOSAL BASELINE CONDITIONS OF PHYTOPLANKTON ASSEMBLAGES,
New York Ocean Science Lab., Montauk.
For primary bibliographic entry see Field 5E.
W78-02785

FEEDING AND GROWTH OF PLANT-EATING FISH IN PONDS OF THE CHITA STATE REGIONAL ELECTRIC POWER PLANT,
L. A. Gurova.
Zap Zabaikal Fil Geogr O-Va SSSR. 62, p 74-84, 1972. Translated from Ref Zh Biol, 1972, No. 101259.

Descriptors: *Carp, Cyanophyta, Algae, Aristichthys-nobilis, Bladderwort, Bulrushes, Charophyta, Chita, Ctenopharyngodon-idella, Diatoms, Electric powerplants, Euglena, Feeding, Fish, Grass, Growth, Milfoil, Oats, Peas, Phytoplankton, Ponds, Pondweed, Reeds, Russian-SFSR, USSR, Willow.

Year-old grass carp (Ctenopharyngodon idella) and 'speckled carp' (Aristichthys nobilis) (22,500 specimens) were reared from June 7 in the embankment-enclosed part of Malyi Kenon bay, Russian SFSR, USSR. After a month there was no natural food in the pond for the grass carp and the fishes were fed the green mass of oat and pea. The daily ration of a grass carp weighing 30 g was 30%, the index of fullness (weight of food as permillage of body weight) was 600% and the role of artificial feed increased with fish size. The preferences of the grass carp for various plants were established experimentally. Well-edible plants were: Charophyta and waterlilies; edible plants: reeds and bulrushes; poorly edible plants: common bladderwort; unedible plants: spiked milfoil (old), curly pondweed and willowgrass. The food of the speckled carp included all species of phytoplankton found in the pond, but diatoms, green algae and Euglena predominated. Blue-green algae were least significant with respect to frequency of occurrence. At the start of June the grass carp had an average length of 11.9 cm and an average weight of 19.9 g and by mid-Sept. reached 15.7 cm and 43.7 g. During this same time the length of the speckled carp increased from 15.7-18 cm and the weight from 34.6-60.0 g.--Copyright 1974, Biological Abstracts, Inc.
W78-02837

RESEARCH PROGRAM ON HAZARD PRIORITY RANKING OF MANUFACTURED CHEMICALS, PHASE II (CHEMICALS 1-20),
Stanford Research Inst., Menlo Park, CA.
For primary bibliographic entry see Field 5A.
W78-02877

BIOECOLOGICAL CONSEQUENCES OF AN ACCIDENTAL OIL SPILL ON ROCKY SHORES OF THE NORMANDY COAST: RESULTS ONE YEAR AFTER OIL POLLUTION ON NOVEMBER 26TH 1974, (IN FRENCH),
Laboratoire de Biologie Anim.-Endocrinol. Saint Aignan (France).
J. C. Peltier, W. Dupont, and J. P. Dupont.
C R Seances Soc Biol Fil 170(2), p 442-448, 1976.

Descriptors: Water pollution effects, Clean-Up(Oil spills), Detergents, Mussels, *Oil spills, *Normandy Beach(France), *Oil pollution.

Along shores where detergents were not used, mussels have progressively excreted the hydrocarbons accumulated in their bodies; the other fixed animals show no change. Along the shores where the detergents were used, their spread and noxious demoecological and synecological consequences with modification of the fixed species colonizing the rocks. The use of detergents to clean polluted shores is not harmless.--Copyright 1978, Biological Abstracts, Inc.
W78-02897

PHOTOSYNTHESIS IN THE AQUATIC MACROPHYTE EGERIA DENSA. I. 14CO2 FIXATION AT NATURAL CO2 CONCENTRATIONS,
Auckland Univ. (New Zealand). Dept. of Botany.
J. A. Browse, F. I. Dromgoole, and J. M. A. Brown.
Australian Journal of Plant Physiology, Vol. 4, No. 2, p. 169-176, April 1977. 2 fig, 23 ref.

Descriptors: *Carbon dioxide, *Photosynthesis, Carbon, Biochemistry, Submerged plants, *Macrophytes, *Calvin cycle, *Carboxylation mechanism, Malate, Egeria densa.

A preliminary study suggested that the four-carbon acids malate and aspartate were important initial products of photosynthesis in the submerged aquatic plants Egeria densa Planch. and Lagarosiphon major. Results of this follow-up study indicate that the Calvin cycle is the major photosynthesis pathway in Egeria densa and that malate is a minor product of fixation under conditions prevailing in the natural habitat. At a high rate under conditions closely approximating those of plants in the field, carbon distribution into 3-phosphoglyceric acid, sugar phosphates and sucrose indicates that the Calvin cycle is the primary carboxylation mechanism and responsible for over 90 percent of the carbon initially incorporated. Malate accounts for only five percent of the initial carbon dioxide fixation and is not actively further metabolized. It is suggested that the predominant carbon fixation into malic acid, noted in previous reports on Hydrocharitacean species, may be due to very low experimental carbon dioxide concentrations and a consequent suppression of the Calvin cycle activity. (Coyle-Wisconsin)
W78-02986

FACTORS CONTROLLING PHYTOPLANKTON PRODUCTION AND SUCCESSION IN A HIGHLY EUTROPHIC LAKE (KINNEGO BAY, LOUGH NEAGH). I. THE PHYTOPLANKTON COMMUNITY AND ITS ENVIRONMENT,
New Univ. of Ulster, Coleraine (Northern Ireland). School of Biological and Environmental Studies.
R. I. Jones.
The Journal of Ecology, Vol. 65, No. 2, p. 547-559, July 1977. 5 fig, 1 tab, 4 ref.

Descriptors: *Seasonal, *Succession, *Primary productivity, Eutrophication, Algae, Nutrients, Phytoplankton, Growth rates, Diatoms, Cyanophyta, *Kinnego Bay, Lough Neagh(Northern Ireland).

Two years of seasonal variations of phytoplankton and some physical and chemical conditions are described for Kinnego Bay, a shallow, highly-eutrophic part of Lough Neagh in Northern Ireland. The shallow water column was well-mixed throughout the study period and vertical heterogeneity with respect to temperature and oxygen saturation was slight. Annual loading of algal nutrients was very great, but concentrations could below as a result of depletion by the large algal growths. Diatoms were dominant in the phytoplankton community during spring and autumn, but blue-green algae predominated during summer. Peak crops of both chlorophyll and algal volume were extremely high. Apparent changes in the algal standing crop were found to be highly dependent on the form in which the algal biomass was expressed. It is suggested, in view of the high loading of nutrients into the bay, that the annual succession of phytoplankton species was not entirely attributable to the nutritional considerations but was at least partly a response to changing physical conditions. It is noted that while Kennego Bay represents one of the most eutrophic lakes yet studied, it is still not possible to separate completely the influence of chemical and physical variables on growth of phytoplankton in the bay. (See also W78-02988 and W78-02989) (Coyle-Wisconsin)
W78-02987

FACTORS CONTROLLING PHYTOPLANKTON PRODUCTION, AND SUCCESSION IN A HIGHLY EUTROPHIC LAKE (KINNEGO BAY, LOUGH NEAGH) II. PHYTOPLANKTON PRODUCTION AND ITS CHIEF DETERMINANTS,
New Univ. of Ulster, Coleraine (Northern Ireland). School of Biological and Environmental Studies.
R. I. Jones.
Journal of Ecology, Vol. 65, No. 2, p. 561-577, July 1977. 8 fig, 1 tab, 39 ref.

Descriptors: *Photosynthesis, *Respiration, *Primary productivity, Light, Temperature, Phytoplankton, Nutrients, Eutrophication, Lakes, *Kinnego Bay(Northern Ireland).

Photosynthesis and respiration of phytoplankton in Kinnego Bay (Northern Ireland) were studied over a two-year period using the oxygen light and dark bottle technique. Hourly areal phytosynthesis was high and was largely independent of irradiance, being closely related to biomass and phytosynthetic capacity. However, daily areal photosynthesis was strongly dependent on a function of radiation which incorporated day length. Since daily radiation is also a determinant of water temperature is exerted a further influence through the photosynthetic capacity, which was strongly correlated with temperature. The values of the annual gross photosynthesis in the bay seem to be some of the highest recorded from a temperate lake and are considered more remarkable in view of the high percentage of incident radiation that is removed by non-algal material in the water column. Such high photosynthetic values are a function of the dense phyoplankton crops maintained throughout the year, which results from an abundance of nutrients at most times that allows the algae to adapt towards maximum photosynthetic efficiency. (See also W78-02987 and W78-02989) (Coyle-Wisconsin)
W78-02988

FACTORS CONTROLLING PHYTOPLANKTON PRODUCTION AND SUCCESSION IN A HIGHLY EUTROPHIC LAKE (KINNEGO BAY, LOUGH NEAGH) III. INTERSPECIFIC COMPETITION IN RELATION TO IRRADIANCE AND TEMPERATURE,
New Univ. of Ulster, Coleraine (Northern Ireland). School of Biological and Environmental Studies.
R. I. Jones.
Journal of Ecology, Vol. 65, No. 2, p. 579-586, July 1977. 3 fig, 21 ref.

Descriptors: *Respiration, *Temperature, *Succession, *Light intensity, *Competition, *Primary productivity, Phytoplankton, Cycles, Model studies, Eutrophication, Lakes, *Kinnego Bay(Northern Ireland), Growth prediction, Light attenuation, Physiological limits.

Respiration rates appropriate to a diatom and a blue-green alga have been deduced from measurements made with natural phytoplankton populations in Kinnego Bay, dominated at different times by these two species. The diatom and alga had different rates of respiration and also different responses of respiratory rates under varying conditions of irradiance and temperature has been applied to a simple model for predicting growth; the model facilitates analysis of factor interaction in determining the competitive ability of each species during the annual phytoplankton cycle. The success of the two species at different times in the Bay appeared largely to be determined by differences in light attenuation properties of their cells, and by relative advantages conferred at different temperatures by their dissimilar respiration responses. While it may be possible to define physiological limits to growth for a particular species when all factors are optimized under laboratory conditions, these limits may not be good indications of the limits to ecological success for that species under natural conditions. (See also W78-02987 and W78-02988) (Coyle-Wisconsin)
W78-02989

THE RECOVERY OF DAMAGED STREAMS,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Biology; Virginia Polytechnic Inst. and State Univ., Blacksburg. Center for Environmental Studies.
For primary bibliographic entry see Field 5G.
W78-02990

LIMNOLOGICAL COMPARISON OF CULTURALLY EUTROPHIC SHAGAWA LAKE AND ADJACENT OLIGOTROPHIC BURNTSIDE LAKE, MINNESOTA,
Pacific Northwest Environmental Research Laboratory, Corvallis, OR.
D. W. Schults, K. W. Malueg, and P. D. Smith.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-265 256, Price codes: A02 in paper copy, A01 in microfiche. Report No. EPA-600/J-76-019. Reprinted from The American Midland Naturalist, Vol. 96, No. 1, p 160-178, July 1976. 1BA1031.

Descriptors: *Eutrophication, *Oligotrophy, *Limnology, Minnesota, Trophic levels, Algae, Lakes, Nutrients, Benthos, Wastewater treatment, Tertiary treatment, Phosphorus, *Shagawa Lake(MN), *Burntside Lake(MN).

Eutrophic Shagawa Lake and nearly oligotrophic Burntside Lake near Ely in northeastern Minnesota were compared for 1971-72, just prior to a lake restoration project initiated in January 1973 involving 99% phosphorus removal from municipal wastewater effluent into Shagawa Lake. Both lakes are characterized by steep shorelines, irregular bottoms, and many islands; mean and maximum depths are 5.7 and 13.7 m for Shagawa Lake, and 15.2 and 48.8 m for Burntside Lake. Typical of Shagawa Lake were extensive summer blue-green algal blooms (Anabaena and Aphanizomenon), anaerobic hypolimnion and large, rapid fluctuations in chemical constituents. Burntside Lake had little algae (predominantly diatoms and green algae), aerobic hypolimnion, and small changes in chemical constituents. Chlorophyll a concentrations in Shagawa Lake reached 50-60 micrograms/l, compared with a maximum in Burntside Lake of 6 micrograms/l. Benthic fauna in Lake was predominantly Chaoborus (up to 28,000 organisms/sq m), while amphipoda predominated in Burntside Lake during the summer (maximum 1,300 organisms/sq m). Inorganic nitrogen was undetectable in the epilimnion in summer in both Shagawa and Burntside Lakes. Epilimnion orthophosphate phosphorus was detectable in Burntside Lake in the summer, but undetectable in Shagawa Lake. In Burntside Lake the thermocline was stable, while in Shagawa Lake the algal biomass was sustained in part by an unstable thermocline which allowed nutrient-rich hypolimnetic water to mix with nutrient-poor epilimnetic water. (Lynch-Wisconsin)
W78-02991

NUTRIENT REGENERATION FROM AEROBIC DECOMPOSITION OF GREEN ALGAE,
Notre Dame Univ., Ind. Dept. of Civil Engineering.
J. V. DePinto, and F. H. Verhoff.
Environmental Science and Technology, Vol. 11, No. 4, p 371-377, April, 1977. 7 fig, 2 tab, 21 ref. EPA 7-801245.

Descriptors: *Nutrients, *Algae, *Bacteria, *Decomposing organic matter, Chlorophyta, Aerobic conditions, Phosphorus, Nitrogen, Eutrophication, Aquatic weed control, Nutrient regeneration, Chlorella vulgaris, Selenastrum capricornutum.

Aerobic bacterial decomposition of algal cultures was studied under laboratory conditions to determine the rate and extent of phosphorus and nitrogen regeneration. Results provided indirect proof that bacteria can also attack algal cells and terminate algal blooms, as bacteria-free cultures remain viable after 70 days in the dark, while cultures inoculated with bacteria decayed rapidly. Axenic unialgal cultures of the green algae Chlorella vulgaris and Selenastrum capricornutum were grown in 5-gal Pyrex bottles in the NAAM medium, which is designed so that phosphorus is the growth-limiting nutrient. All eight cultures (six Chlorella and two Selenastrum) were moved into a dark room after four-nine days, and six were inoculated with bacteria from eutrophic Stone Lake, Cassopolis, MI. Initial nutrient concentrations in the medium were 80 or 186 micrograms P/l (as PO4), and 1600 or 4200 micrograms N/l (as NO3). Vessels were monitored during the dark incubation period for changes in phosphorus, nitrogen, chemical oxygen demand (COD), suspended solids, and algal and bacterial densities. Phosphorus regeneration in the bacteria-inoculated cultures ranged from 31-94% (mean 74%) with higher release associated with excess initial cellular phosphorus. Conversion of particulate organic nitrogen to NH3 ranged from 51-94% (mean 74%). No net phosphorus regeneration occurred in bacteria-free cultures. Decay rate was highly dependent on the size of the bacterial population. Active bacterial decomposition was far more important than endogenous respiration by the algal cells. (Lynch-Wisconsin)
W78-02992

EFFECTS OF INTERMITTENT CHLORINATION ON AQUATIC ORGANISMS AND COMMUNITIES,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Biology; and Virginia Polytechnic Inst. and State Univ., Blacksburg. Center for Environmental Studies.
K. L. Dickson, J. Cairns, Jr., B. C. Gregg, D. I. Messenger, and J. L. Plafkin.
Journal Water Pollution Control Federation, p 35-44, January, 1977. 8 fig, 7 tab, 23 ref.

Descriptors: *Chlorination, *Fish, *Protozoa, *Water treatment, Chlorine, Toxicity, Water pollution effects, Fishkill, Carrasius auratus, Goldfish, Intermittent chlorination.

Because of widespread use of chlorine to prevent biological slime build-up in industrial cooling systems, aquatic organisms are subject to intermittent exposures of the chemical. In this study of effects of such intermittent exposure, laboratory tests of exposure, frequency concentration, forms of chlorine, and duration of exposure were related to goldfish (Carasius auratus) mortality and changes in protozoan community structure. Data for goldfish showed that as frequency and duration of exposure increased, mortality also increased, but the mortality rate of change decreased with increasing frequency and duration. Frequency increases were somewhatmore lethal than duration increases. Water temperature and fish size did not affect mortality. Combined chlorine was slightly more toxic than free chlorine, which contradicts most freshwater studies. A chlorination procedure of two-three exposures of 15-30 minutes per day with a total residual chlorine concentration of 0.5-0.75 mg/l would not result in acute lethality to species similar in reaction to goldfish. In each of seven protozoa experiments exposure to chlorine substantially reduced the total number of individuals; the most frequent exposures caused the greatest decrease. Species diversity was not greatly affected at concentrations under 1.45 mg/l given three times in a 2-hour period, but at greater frequencies diversity decreased. Eleven species were judged relatively tolerant to chlorine. (Lynch-Wisconsin)
W78-02993

EVALUATION OF THE ALGAL ASSAY PROCEDURE,
North Carolina Univ. at Chapel Hill. School of Public Health.
For primary bibliographic entry see Field 5A.
W78-02996

TEST OF REDFIELD'S MODEL FOR OXYGEN-NUTRIENT RELATIONSHIPS USING REGRESSION ANALYSIS,
Oregon State Univ., Corvallis. Dept. of Statistics.
D. Guthrie, S. Alvarez-Borrego, Ch. H. Culbertson, and P. K. Park.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A033 154, Price codes: A02 in paper copy, A01 in microfiche. Limnology and Oceanography, Vol 20, No 5, p. 795-805, September 1975. 13 fig, 4 tab, 10 ref. NR 083-102, GX-28167, GA-12113, N00014-67-A-0369-007.

Descriptors: *Oxygen, *Nutrients, *Model studies, *Phosphates, *Regression analysis, Nitrates, Dissolved oxygen, Carbon dioxide, Atlantic Ocean, Pacific Ocean, Equations, *Redfield's model.

Hydrographic data from stations in the Atlantic and Pacific Oceans was used to test Redfield's model for a relationship among the concentrations of dissolved oxygen, carbon dioxide, nitrate, and phosphate in seawater based on the average chemical composition of plankton. This relationship predicts that the ratio of oxygen consumption to nutrient production by biological oxidation is constant and can be expressed by an equation given in this paper. Redfield's model of the 02-P04 and 02-N03 relationships was tested by applying multiple regression analysis to oxygen, phosphate, and nitrate field data. The 95% confidence intervals for delta 02:delta P04 and delta 02:delta N03 ratios were consistent with -values predicted by Redfield's model. The variation of 02-P04 and 02-N03 slopes with depth, latitudes, and time is due to mixing between different water types with different preformed portions of oxygen, phosphate, and nitrate. Diagrams of 02 residuals after regression of 02 on potential temperature (theta) and P04 on theta or N03 can be used to detect water types, some of which are not clearly shown by theta-salinity diagrams. Qualitative studies on the proportions of water types at different stations can also be done using the 01 residuals versus theta diagrams. (Lynch-Wisconsin)
W78-02997

FEEDLOT MANURE TOP DRESSING FOR IRRIGATED PASTURE: GOOD AGRICULTURAL PRACTICE OF A HEALTH HAZARD,
Department of Agriculture, Lethbridge (Alberta). Research Station.
For primary bibliographic entry see Field 5G.
W78-03000

DYNAMICS OF WATER-SOLUBLE ORGANIC MATTER AND BIOGENIC ELEMENTS IN BOTTOM SEDIMENTS OF THE TSYBUL'NIK BAY IN THE KREMENCHUG RESERVOIR, (IN RUSSIAN),
Akademiya Nauk URSR, Kiev. Inst. Hidrobiologii.
For primary bibliographic entry see Field 5B.
W78-03001

STUDIES ON DEGRADATION OF ADENOSINE-5' PHOSPHOSULPHATE ADENOSINE-3'-PHOSPHATE-5'-PHOSPHOSULPHATE (PAPS) IN EXTRACTS OF ANABAENA CYLINDRICA,
Adelaide Univ. (Australia). Dept. of Agricultural Biochemistry and Soil Science.
S. K. Sawhney, and D. J. D. Nicholas.
Plant Science Letters, Vol. 6, No. 2, p. 103-110, February 1976. 4 fig, 3 tab, 23 ref.

Descriptors: *Cyanophyta, *Laboratory tests, Eutrophication, Cytological studies, *Anabaena cylindrica, Sulphate metabolism, Cell free extracts, Hydrolytic enzymes.

Research indicates that cell-free extracts of Anabaena cylindrica contain enzymes which hydrolyse adenosine-5' phosphosulphate (APS)

and adensine-3' phosphate-5' phosphosulphate (PAPS) fairly rapidly. The occurrence of such hydrolytic enzymes has been reported in extracts of various organisms. No attempt has been made to characterize the enzymes which degrade these nucleotides. However, the protective effect of sodium fluoride and sodium sulphite indicates that part of PAPS was sulphatases (19). The accumulation of (35S)APS during the degradation of (35S)PAPS is the presence of unlabelled APS suggests that PAPS was also attacked, presumably by 3'-nucleotidase, to form APS. The experiments emphasize the problem of interference from hydrolytic enzymes when using unpurified extracts for investigating synthesis and metabolism of these sulphur by elimination of the hydrolytic enzymes by their removal on purification of extracts or by supplementing the incubation mixture with various compounds. In this context, the addition of 5'adenine nucleotides protects PAPS and APS against hydrolytic enzymes in cell extracts. (Coyle-Wisconsin)
W78-03002

EFFECT OF SULFATE ON CARBON AND ELECTRON FLOW DURING MICROBIAL METHANOGENESIS IN FRESHWATER SEDIMENTS,
Wisconsin Univ.-Madison. Dept. of Bacteriology.
M. R. Winfrey, and J. G. Zeikus.
Applied and Environmental Microbiology, Vol. 33, No. 2, p. 275-281, February 1977. 7 fig, 1 tab, 23 ref. NSF DEB 73-01511-A01.

Descriptors: *Sulfates, *Methane production, Wisconsin, Sedimentation, Lakes, *Lake Mendota(WI), *Sediment chemistry, *Methanogenesis, Acetate.

The effect of sulfate on methane production in the sediments of Lake Mendota, Wisconsin was investigated to clarify the mechanism of sulfate inhibition of methanogenesis. Methanogenesis was inhibited by the addition of as little as 0.2 mM sulfate. Sulfate inhibition was reversed by addition of either H2 or acetate. Methane evolved when inhibition was reversed by H2 addition derived from CO2. Conversely, when acetate was added to overcome sulfate inhibition, the evolved methane was derived from acetate. A competition for available H2 and acetate is proposed as the mechanism by which sulfate inhibited methanogensis. Acetate was metabolized even in the absence of methanogenic activity. In the presence of sulfate, the methyl position of acetate was converted to CO2. The addition of sulfate to sediments did not result in the accumulation of significant amounts of sulfide in the pore water. Results indicate that carbon and electron flow are altered when sulfate is added to sediments. Sulfate-reducing organism appear to assume the role of methanogenic bacteria in sulfate-containing sediments by utilizing methanogenic precursors. (Coyle-Wisconsin)
W78-03003

SALMONELLA IN SURFACE WATERS OF CENTRAL NEW YORK STATE,
New York State Coll. of Agriculture and Life Sciences, Ithaca.
N. C. Dondero, C. T. Thomas, M. Khare, J. F. Tomoney, and G. M. Fukui.
Applied and Environmental Microbiology, Vol. 33, No. 4, p 791-801, April, 1977. 4 fig, 2 tab, 40 ref.

Descriptors: *Salmonella, *Bacteria, *Feed lots, *Water pollution sources, *Public health, New York, Tributaries, Watersheds(Basins), Pathogenic bacteria, Water pollution effects, Pollutants, Urban runoff, Agricultural runoff, Lakes, Streams, Human pathology, Botulism, *Cayuga Lake(NY), Salmonella typhimurium, Nonpoint pollution, Taughannock Creek(NY).

Although salmonellosis is usually associated with contaminated foods and feeds, salmonellae have frequently been found in streams receiving sewage effluents and industrial wastes. Southern Cayuga Lake and six tributaries (Taughannock, Fall, Sixmile, Trumansburg, and Cascadilla creeks, and Renwick Brook) in central New York state were sampled for Salmonella using swabs; 39% of 322 swabs yielded Salmonellae. Tests performed on white mice showed that the virulence of 144 Salmonella isolates was low or nonexistent. Fatal at one million cells per mouse were S. agona, S. enteritidis, a few S. typhimurium isolates, and S. saint-paul. Human salmonellosis was low in the area, consistent with low Salmonella concentrations and virulence in the waters. Of 28 distinguishable types from all locations, S. typhimurium was by far the most common (60%), and was absent only from Renwick Brook and Trumansburg Creek. In all streams 57% of samples were positive at high stream levels after snow melt or rain, compared with only 24% during dry weather flow. A cattle feedlot on a Taughannock Creek tributary was the only definitely identified Salmonella source, and yielded only S. typhimurium. Of swabs from just below the feedlot, 86% were positive. Urban runoff was a likely source and has been known to contain Salmonella. Rural dwellings and sewage treatment plants could also have been point sources. (Lynch-Wisconsin)
W78-03004

EFFECTS OF DESTRATIFICATION AND AERATION OF A LAKE ON THE DISTRIBUTION OF PLANKTONIC CRUSTACEA, YELLOW PERCH, AND TROUT,
Wisconsin Dept. of Natural Resources, Madison.
O. M. Brynildson, and S. L. Serns.
Technical Bulletin, No. 99, p 1-22, 1977. 11 fig, 4 tab, 26 ref.

Descriptors: *Aeration, *Destratification, *Wisconsin, *Lakes, *Crustacea, *Yellow perch, Plankton, Distribution, Eutrophication, Brook trout, Rainbow trout, Brown trout, *Trout, *Mirror Lake(WI), *Larson Lake(WI), Bosmina, Diaphanosoma, *Destratification, Calanoid copepod, Cyclopoid copepod.

Aeration equipment was installed and its use monitored in Mirror and Larson lakes, Wisconsin, to study problems associated with eutrophication. In the Mirror Lake study the main objective was to observe what effects the September 1973-74 vertical mixing had on the depth distribution of yellow perch and trout and their planktonic prey, with emphasis of Daphnia. Studies at Larson Lake were limited to observations on the distribution of planktonic crustacea during hypolimnetic aeration and on assessment of the food of perch and trout after a natural destratification (the fall overturn). While before the destratification the Mirror Lake fish and their prey occupied mainly the upper half of the lake, they spread throughout the water after September 1974. Although the 1973 destratification had little effect on Daphnia numbers, they increased four-fold after the 1974 change. Densities of calanoid and cyclopoid copepods (but not of the cladocerans Bosmina and diaphanosoma) increased during both years after destratification. Total aeration of Mirror Lake in the spring hastened the Daphnia pulicaria spring population pulse and increased their living space as well as that of their predators. Total aeration into late fall 1973-74 helped to maintain higher dissolved oxygen levels and carried over trout into winter. Total aeration in spring and fall is the most efficient way to expand living space for trout and yellow perch in lakes with uniform water density. Prolonged total aeration in spring augmented by intermittent hypolimnetic aeration during summer is the most efficient means of increasing trout and yellod perch in darkstained bog lakes such as Larson Lake. (Spaeth-Wisconsin)
W78-03006

CHROMATOGRAPHIC INVESTIGATION OF INOSITOL PHOSPHATE ESTERS IN LAKE WATERS.
Wisconsin Univ.-Madison. Water Chemistry Lab.
Water Chemistry Laboratory, University of Wisconsin, Madison.
For primary bibliographic entry see Field 5A.
W78-03007

PHOSPHORUS MODELS FOR EUTROPHIC LAKES,
Michigan Univ., Ann Arbor.
W. S. Lung, R. P. Canale, and P. L. Freedman.
Water Research, Vol. 10, p. 1101-1114, 1976. 13 fig, 2 tab, 25 ref. EPA G-00-5104.

Descriptors: *Phosphorus, *Model studies, *Eutrophication, *Lakes, Michigan, Sediments, Sediment-water interfaces, Sedimentation, Nutrients, Dissolved oxygen, Dissolved solids, Water quality, *White Lake(MI), Particulates.

A multi-component dynamic phosphorus model was developed for highly eutrophic White Lake in southwest Michigan and was calibrated and verified by extensive field data. Two layers in the water and 38 1-cm layers of the sediment were incorporated in the model, and both particulate and dissolved phosphorus were considered. White Lake, which has an outlet into Lake Michigan, has a surface area of 10.4 million sq m and a mean depth of 7.9 m. White River is the only major tributary, and has a drainage area of 1000 sq km. Sediment regeneration of dissolved phosphorus was found to be important in White Lake, especially during summer anaerobic periods; the main mechanism was diffusion across the sediment-water interface. In the model the space coordinate system was designed to move with the interface as sedimentation and compaction cause it to move upward, so that sediment properties are always observed relative to the interface. Processes involved in particulate-dissolved phosphorus transformation include oxidation and breakdown of sedimented organic material, oxidation and reduction of associated inorganic species, physiochemical adsorption and precipitation, and solution of phosphorus to and from mineral forms. Vertical eddy diffusion in the water was also analyzed. (Lynch-Wisconsin)
W78-03008

REAL TIME SIMULATION OF NITROGEN CYCLE IN AN ESTUARY,
Resource Analysis, Inc., Cambridge, MA.
For primary bibliographic entry see Field 5B.
W78-03010

THE MINERAL NUTRIENTS LEVELS IN THREE NORFOLK BROADS DIFFERING IN TROPHIC STATUS, AND AN ANNUAL MINERAL CONTENT BUDGET FOR ONE OF THEM,
University of East Anglia, Norwich (England). Schools of Biological; and University of East Anglia, Norwich (England). Environmental Sciences.
G. L. Phillips.
Journal of Ecology, Vol. 65, No. 2, p 447-474, July 1977. 13 fig, 8 tab, 14 ref.

Descriptors: *Bogs, *Nutrients, *Eutrophication, *Lakes, Phosphorus, Nitrogen, Silica, Manganese, Cyanophyta, Trophic level, Sediments, *Norfolk Broads(England), Nutrient budget.

The seasonal range and variation of phosphorus, nitrogen, silica and manganese were studied in three Norfolk Broads, Alderfen Broad, Barton Broad and Upton Broad. The Norfolk Broads are a series of shallow, flooded peat diggings created in medieval times and now extremely important as recreation areas of great ecological interest. At all the sites nitrate-nitrogen was maximal during the winter, usually undetectable in the summer. At Alderfen and Barton Broads a large increase of solu-

ble reactive phosphorus occurred during the summer. At Alderfen Broad this was accompanied by an increase of ammonium nitrogen, manganese and soluble reactive silica. A nutrient budget was calculated for Alderfen Broad and this showed that the increase of these nutrients could not be accounted for by the input stream. It is suggested that the sediment was an important source of these nutrients during the summer. It is suggested that these three broads are typical of the range of conditions present in the Norfolk Broads as a whole, with Barton Broad highly enriched, Alderfen Broad less enriched, and Upton Broad typical of a broad as yet unaffected by increased enrichment. (Coyle-Wisconsin)
W78-03011

CORRESPONDENCE OF AMMONIA CONTENT AND ACETYLENE REDUCTION ACTIVITY IN SLUDGE SAMPLES OF LAKE HARKORT (RUHR VALLEY), (IN GERMAN),
Staatliches Amt Wasser-und Abfallwirtsch. Hagen (West Germany).
D. Jaeger, and D. Werner.
Arch Hydrobiol 79(2), p 233-246, 1977.

Descriptors: *Ammonia, *Acetylene reduction, *Sludge, Sampling, Lakes, *Metabolism, Microorganisms, Nitrogen, *Lake Harkort(West Germany)

Studies on microbiological N-metabolism in lake Harkort (part of the Ruhr river system) revealed a linear relationship between ammonia content of the sediments (84-265 mg/kg sludge) and their acetylene reduction activity (83-314 nmol C2H4/h x kg sludge). Compared to the annual ammonium-N content of the water of the Ruhr river, the Nz-fixation in the sediments of the small lake Harkort is 0.444%. N2-fixation in the sludge was increased by ammonia up to concentrations of 80 mmol/kg and inhibited by higher concentrations added to samples.--Copyright 1978, Biological Abstracts, Inc.
W78-03012

DISTRIBUTION, ABUNDANCE, AND RESOURCE UTILIZATION OF LITTORAL ZONE FISHES IN RESPONSE TO A NUTRIENT/PRODUCTION GRADIENT IN LAKE MEMPHREMAGOG,
McGill Univ., Montreal (Quebec). Dept. of Biology.
D. Gascon, and W. C. Leggett.
Journal of the Fisheries Research Board of Canada, Vol. 34, No. 8, p 1105-1117, August 1977. 3 fig, 2 tab, 61 ref.

Descriptors: *Nutrients, *Fish diets, Fish, Larvae, Food abundance, Competition, Vermont, Lakes, Littoral, Distribution, Biomass, Primary productivity, Secondary productivity, Rivers, Minnows, Darters, Canada, *Lake Memphremagog(Quebec-Vermont), Quebec, Notropis volucellus, Hybognathus nuchalis, Pimephales notatus, Notemigonus crysoleacas, Fundulus diaphanus, Etheostoma nigraum.

The investigation used the presence of a strong nutrient production gradient in a single lake ecosystem (Lake Memphremagog) to study the relationship between fish community composition and patterns of resource utilization by littoral zone fishes at different levels of primary and secondary production. The study concludes that the differences in the levels of primary and secondary production (food availability) along the axis of Lake Memphremagog, resulting from the presence of a pronounced nutrient gradient, are the principal causes of observed changes in the species diversity, community composition, relative biomass, and patterns of resource utilization in the littoral zone fish community of the lake. Species diversity, relative abundance, and biomass were highest in the more productive southern area of the lake similar to that observed in stream ecosystems. And much greater overlap was observed in the diets of species inhabiting the southern areas, and species feeding exclusively on organic detritus were largely restricted to Newport Bay and the south basin. Composition of the littoral zone fish community and the pattern of utilization of available lake resources also appear to be strongly influenced by differences in food availability along the length of the lake. (Coyle-Wisconsin)
W78-03013

ANALYSIS OF ZOOPLANKTON POPULATION FLUCTUATIONS IN THE STRAIT OF GEORGIA, BRITISH COLUMBIA,
British Columbia Univ., Vancouver. Inst. of Oceanography.
G. A. Gardner.
Journal of Fisheries Research Board Canada, Vol. 34, No. 8, p 1196-1206, 1977. 5 fig, 6 tab, 25 ref.

Descriptors: *Copepods, *Analytical techniques, *Aquatic populations, *Straits, Hydrologic data, Distribution patterns, Temperature, Salinity, Canada, *Strait of Georgia(British Columbia).

To examine relationships between zooplankton species within a community and the interaction between species groups and the physical environment in the Strait of Georgia, data from a series of vertical and horizontal tows have been analyzed by a variety of statistical techniques. Association of deep-water temperatures with population levels of two important copepod species, and the demonstration of parallel long-term temperal trends in the hydrographic and biological regimes, suggest that the strait is in a state of flux. Whether this is a transient shift that will eventually change directions or part of a longer term trend that may accelerate in future cannot be resolved with currently available data. But the former possibility may be more probable. However it is suggested that monitoring for long term trends should continue. Such studies may be very important to future management and conservation programs for the Strait of Georgia and will greatly improve understanding of the complex interactions between the physical and biological components of the system. (Coyle-Wisconsin)
W78-03014

SOMATIC AND GENERATIVE PRODUCTION AND SIZE OF PLANKTONIC CRUSTACEANS,
Belorussian State Univ., Minsk (USSR).
V. A. Babitskii.
The Soviet Journal of Ecology, Vol. 7, No. 5, p. 425-430, September-October, 1976. 6 fig, 2 tab, 20 ref. Translated from Ekologiya, No. 5, p. 47-52, September-October, 1976.

Descriptors: *Crustaceans, *Growth stages, *Copepod, Zooplankton, Lakes, Size, Trophic level, Biomass, Productivity, *Generative production, *Belorussian(USSR), Lake Naroch(USSR), Lake Myastro(USSR), Lake Batorin(USSR).

A graphical method was used to calculate the growth and generative production of five crustacean species of the benthic plankton of Lakes Naroch, Myastro and Batorin in Belorussian, USSR. The values of the P/B coefficients of growth production were higher in species with greater body size, while the fraction of generative production from the total production declined in going from the smaller to the larger species of copepod and cladoceran crustaceans. A contradictory tendency was found in comparing the relative value of generative and growth production in species of different size. In the species with the smallest body size, the generative production in Lakes Naroch, Myastro and Batorin comprised respectively 86, 92 and 94 percent of the total. In the considerably larger species in generative growth was 44 percent in Lake Batorin, only 27 percent in Lake Myastro and 67 percent in Lake Naroch. In copepods with decrease in body length the fraction of generative increase from the total increase grew from tenths of a percent in Eudiaptomus to eight percent in Cyclops. Also, as body lenght increased, a tendency towards decrease in the generative P/B coefficients was observed. (Coyle-Wisconsin)
W78-03015

STRUCTURE OF SEASONAL ZOOPLANKTON COMPLEXES OF VOLGO GRAD RESERVOIR,
Gosudarstvennyi Nauchno-Issledovatelskii Inst. Ozernogo i Rechnogo Rybnogo Khozyaistva, Saratov (USSR).
V. P. V'yushkova.
The Soviet Journal of Ecology, Vol. 7, No. 5, p. 419-424, September-October, 1976. 1 fig, 3 tab, 18 ref. Translated from Ekologiya, No. 5, p. 41-46, September-October, 1976.

Descriptors: *Zooplankton, Food abundance, Copepods, Rotifers, Crustaceans, Protozoa, Reservoirs, *Seasonal, Temperature, *Volgograd Reservoir(USSR).

The zooplankton composition of Volgograd Reservoir in different seasons of the year was examined on the basis of materials collected in 1966. In temperate Palasarctic latitudes the principal factor determining seasonal changes is the position of the sun and the temperature and hydrologic conditions depending on it, influencing the life activity of both zooplankton organisms and the phyto- and bacterioplankton organisms that are their food. During the winter time at a temperature from 0 to 4 degrees C the zooplankton was characterized by the lowest level of development. The majority of the organisms were in the form ofeggs or dominant stages. However, representatives of all groups were occasionally encountered in an active state. In April, copepods, especially in their young stages, were encountered. Thus the existence of seasonal species complexes regularly changing in relation to outside conditions was established. The amount of heat and food is the leading factor affecting zooplankton change in the reservoir. The zooplankton changes quantitatively and qualitatively, with the greatest development and diversity characteristic of the warm time of the year. (Coyle-Wisconsin)
W78-03016

A NOTE ON SOME DISTINCTIVE LIMNOLOGICAL FEATURES OF GOVINDSAGAR RESERVOIR, HIMACHAL PRADESH,
Central Inland Fisheries Research Inst., Barrackpore (India); and All-India Coordinated Research Project on Ecology and Fisheries of Fresh Water Reservoirs, Hazribagh (India).
S. K. Sarkar, B. V. Govind, and A. V. Natarajan.
Indian Journal of Animal Sciences, Vol. 47, No. 7, p. 435-439, July 1977. 1 fig, 2 tab, 11 ref.

Descriptors: *Limnology, *Reservoirs, *Thermal stratification, Aerobic conditions, Alkalinity, Plankton, Impoundments, *Govindsagar reservoir(India).

Though general limnological information is available for some impoundments in peninsular India, it is only recently that reservoirs in north India have been subjected to similar observations. Govindsager reservoir, located at a latitude far above any reservoir studied so far, presents certain interesting limnological features. The impoundments present thermal stratification in summer. Impoundments in lower latitudes are conspicuous by the absence of thermal stratification in summer months. In Govindsagar the epilimnion, marked by near homothermal conditions, was limited to 3 m from surface. The oxygen curve followed a pattern similar to thermal stratification and represented a klinograde distribution. It was remarkable that while oxygen values were as high as 9.4 ppm in the epilimnion its values dropped sharply to 2.3 ppm at the hypolimnion bottom. The behavior of the oxygen curve indicated the

metabolically active character of the reservoir. The impoundment was equally interesting from the point of view of abundance and qualitative composition of plankton. The plankton concentration was more or less of uniform density in littoral, sub-littoral and profundal areas of lotic zone but they occurred in significantly higher concentrations in sub-littoral areas of intermediate and lentic zones. (Coyle-Wisconsin)
W78-03017

BIOMASS PRODUCTION IN MASS CULTURES OF MARINE PHYTOPLANKTON AT VARYING TEMPERATURES,
Woods Hole Oceaographic Institution, MA.
J. C. Goldman.
Journal of Experimental Marine Biology and Economy, Vol. 27, No. 2, p. 161-169, May 1977. 2 fig, 2 tab, 27 ref.

Descriptors: *Phytoplankton, *Temperature, Nitrogen, Food chains, Growth rates, Nutrients, Marine algae, Sea water, Waste water disposal, Proteins, Aquiculture, Effluents, Laboratory tests, *Biomass, *Nutrient uptake, Phaeodactylum tricornutum, Nitzschia sp., Oscillatoria sp.

Natural populations of marine phytoplankton obtained from a large outdoor pond were grown on waste water-sea water mixtures in laboratory continuous cultures in the temperature range of five degrees centigrade to 33 degrees. This method was chosen because it is impossible to completely isolate temperature as the only variable in outdoor studies. The phytoplankton was grown under conditions similar to those typically used outdoors in the aquaculture research program at the Environmental Systems Laboratory of the Woods Hole Oceanographic Institution. Virtually all the influent inorganic nitrogen was assimilated at every temperature tested. There was, however, a distinct change in dominant species with temperature. Below 19.8C, Phaeodactylum tricornutum was dominant. At 27 degrees C, Nitzshia sp. was the main species, and as the temperature increased above 27 degrees C, a blue-green alga, Oscillatoria sp., became increasingly dominant. There is some indication that the excellent growth of P. tricornutum below 10 degrees C was related to a dramatic increase in the nutrient content per cell as the temperature decreased. Thus at low temperatures reduced division rates are compensated for by increased nutrient uptake rates. (Coyle-Wisconsin)
W78-03018

DISTRIBUTION OF PLANKTONIC OSTRACODA (HALOPRIDIDAE) IN THE NORTH ADRIATIC WITH THE DESCRIPTION OF A NEW SUBSPECIES, CONCHOECIA PORRECTA ADRIATICA,
Institute of Oceaographic Sciences, Wormley (England).
A. J. Gooday, and M. V. Angel.
Crustaceana, Vol. 32, No. 2, p. 139-154, 1977. 10 fig, 2 tab, 24 ref.

Descriptors: *Adriatic sea, *Conchoecia porrecta, *Ostracods, Plankton, *Halocyprid ostracods, *Spatial distribution, *Systematics, *Crustaceans, Temporal distribution, Salt tolerance.

The paper deals with the geographic distribution of planktonic halocyprid ostracods in the north Adriatic sea. A small form of Conchoecia porrecta Claus 1891 collected from this region, is described as a new subspecies. Maps are included showing numbers of ostracods caught at each station during January, February, March, May, June, August, September and December, 1965. Specimen drawings are part of the paper, along with detailed descriptions of the newly-identified subspecies. A total of 975 adult and juvenile planktonic ostracods were caught. Of these, 699 belonged to the new subspecies. Taking the year as a whole, ostracods were much commoner in the southern part of the north Adriatic. Results confirm and document more fully the northerly winter movement of planktonic ostracods. The movement is clearly linked with the influx of warm saline Mediterranean water in the intermediate and surface layers of the Adriatic. This Adriatic ingression is much stronger in certain years and displaces elements of the dominantly oceanic south Adriatic fauna. The halocyprids are thus a seasonal and essentially allochthonous element of the north Adriatic fauna. (Coyle-Wisconsin)
W78-03019

PLANKTONIC DIATOMS AND SOME DIATOM-SILICA RELATIONS IN A SHALLOW EUTROPHIC SCOTTISH LOCH,
Institute of Terrestrial Ecology, Edinburgh (Scotland). Wetlands Research Group.
A. E. Bailey-Watts.
Freshwater Biology, Vol 6, No 1, p 69-80, 1976. 6 fig, 6 tab, 63 ref.

Descriptors: *Diatoms, *Silica, *Eutrophication, Phytoplankton, Shallow water, Nutrients, Algae, Grazing, Frustules, Trophic levels, Mixing, Nutrient requirements, Oligotrophy, Lakes, *Loch Level(Scotland), Lochs, Centric diatoms, Cyclotella pseudostelligera, Stephanodiscus hantzschii, Stephanodiscus tenuis, Stephanodiscus rotula.

Studies of planktonic diatom populations of Loch Leven, Kenross, Scotland, in 1968-71 showed considerable variation in species composition, with centric forms dominant. Loch Leven, which covers 13.3 sq km, has a mean depth of only about 4 m. The water column is isothermal most of the year. Rich inputs of nitrogen and phosphorus are due to urban and agricultural activities, and the resultant eutrophic conditions are conducive to high phytoplankton production. Temperature, chlorophyll-a, cell numbers, algal volumes, and silica were monitored. Of centric diatoms, Cyclotella pseudostelligera, Stephanodiscus hantzschii, S. tenuis, and S. rotula predominated. Centric species formed denser crops than pennate forms and were more important in terms of volume of matter produced over the four years. Other important diatoms were Diatom elongatum, Asterionella formosa, Synedra ulna, and S. rumpens var. scotica. The predominance of centric diatoms in this eutrophic lake is not in accordance with other studies which showed Centrales reflecting oligotrophy and Araphidineae (Pennales) indicating eutrophy; on the other hand, such associates were best illustrated by deep dimictic lakes. Lock Leven produced very dense diatom populations. With exceptions, the data generally corroborated other studies in which diatom maxima coincided with low levels of dissolved silica, but Silica was apparently not the only limiting factor. (Lynch-Wisconsin)
W78-03020

GLUTAMINE SYNTHETASE AND NITROGENASE ACTIVITY IN THE BLUE-GREEN ALGA ANABAENA CYLINDRICA,
Dundee Univ. (Scotland). Dept. of Biological Sciences.
P. Rowell, S. Enticott, and W. D. P. Stewart.
The New Phytologist, Vol 79, No 1, p 41-54, July 1977. 10 fig, 6 tab, 34 ref.

Descriptors: *Cyanophyta, *Nitrogen fixation, *Inhibitors, Ammonium compounds, Anabaena, Regulation, Synthesis, Enzymes, Biochemistry, *Glutamine synthetase, Glutamine pool, *Anabaena cylindrica, Nitrogenase activity.

The ways in which the glutamine synthetase of Anabaena cylindrica is regulated and the relationship between nitrogenase activity and glutamine synthetase activity are examined. On adding NH4+ to nitrogen-fixing cultures of Anabaena cylindrica, the glutamine pool of the intact filament increases within seconds. Nitrogenase activity and then glutamine synthetase activity decline. There are no changes in the activities of glutamate-asparatate aminotransferase, or in the pools of alanine, glycine and aspartate during this period. Nitrogenase activity is usually inversely related to the size of the glutamine pool and shows little correlation with glutamine synthetase activity per se. There is no evidence of adenylylation or deadenylylation of glutamine synthetase. Feed-back inhibition occurs, with alanine and glycine being particularly effective inhibitors and with some inhibition occurring with AMP, carbamoyl phosphate and aspartate. Histidine, lysine, ornithine, citrulline and arginine were non-inhibitory at the concentrations used. There is no evidence of inhibition of glutamine synthetase by glutamine. The addition of azaserine inhibits glutamine uptake by intact filaments and reduces the subsequent conversion of glutamine to glutamate within the filament by 77 percent. Results are consistent with the operation of the glutamine synthetase-glutamate synthase pathway in Anabaena cylindrica. (Coyle-Wisconsin)
W78-03021

MACROPHYTE SUCCESSION IN SWEDISH LAKES CAUSED BY DEPOSITION OF AIRBORNE ACID SUBSTANCES,
Swedish Water and Air Pollution Research Lab., Gothenburg.
O. Grahn.
Water, Air and Soil Pollution, Vol 7, No 3, p 295-305, March 1977. 6 fig, 20 ref.

Descriptors: *Precipitation(Atmospheric), *Acidity, Lakes, Ecosystems, Trophic levels, Water pollution effects, Air pollution effects, *Path of pollutants, *Sweden, *Sphagnum, *Macrophytes, *Acid precipitation.

Biological investigations in six small lakes in western Sweden found that the supply of acid substances from air pollution induces long term biological perturbations at all trophic levels in the lake ecosystem. It is concluded that plant community succession in the lakes occurs over a short period and that these changes are correlated with the increasing acidity of the lake water. The ecosystems of the lakes has changed from one of equilibrium to a biologically-accumulating system similar to acid biogene peat and forest soils. This type of system may cause an acceleration of the acidification process, which in turn leads to further disorders in the lake ecosystem. The disturbances occur among fish, macrophytes, bottom fauna, and plankton as well as among microorganisms. Of these ecological changes, the macrophyte succession--in particular that of Sphagnum--is one that may strongly affect the dynamics in the lake. A quantification of the Sphagnum expansion in different depth zones of a lake was made and the rate of this invasion was found to be highest in shaded and sheltered areas of the littoral. Abundance of Sphagnum mats is further more negatively correlated to the pH of the lake water. (Coyle-Wisconsin)
W78-03022

APPLICATION OF UNDERWATER LIGHT MEASUREMENTS IN NUTRIENT PRODUCTION STUDIES IN SHALLOW RIVERS,
Ontario Ministry of the Environment, Rexdale. Limnology and Toxicity Section.
S. L. Wong, B. Clark, and D. S. Painter.
Freshwater Biology, Vol 6, No 6, p 543-550, 1976. 6 fig, 1 tab, 39 ref.

Descriptors: *Light intensity, *Light penetration, *Solar radiation, *Nutrients, *Photosynthesis, *Rivers, Turbidity, Depth, Aquatic plants, Cladophora, Oxygen, Measurement, Aquatic weed control, Phosphorus, Canada, Underwater, Submerged plants, *Cladophora glomerata, *Underwater light, Ontario(Canada).

Relationships between photosynthesis of a substrate-attached aquatic plant (Cladophora

glomerata (L.) Keutzing), solar radiation at the water surface, and light energy at the plant depth are discussed, and practical uses of underwater light measurements in stream productivity studies are described. Photosynthetic production was positively correlated with light energy received at the plant depth (r=0.73). Six rivers in southwestern Ontario (Canada) were studied: Avon, Middle Maitland, Bayfield, Nith, Conestogo, and Thames. Solar radiation above the water surface was measured with a Weather Measure R401 Pyranometer, light transmission through the water column was measured with an underwater quantum sensor, LI-COR model 185. Oxygen fluctuation was monitored with E.I.L. oxygen meters and Rustrak recorders. Water temperature was not considered; photosynthetic oxygen production is relatively independent of temperature when light is the limiting factor, and temperature was relatively constant during the study. Since luxury storage of nutrients allows aquatic plants to grow independently of external nutrient sources, tissue contents were used as an index of phosphorus availability. Daily oxygen production is governed by nutrient supply as well as the availability of light energy, and plant growth is poorly related to phosphorus when correction is not made for the effect of light energy. It was found that photosynthesis of Cladophora was not affected by nutrients if the cellular phosphorus concentration remained above 1.7 mg/g dry weight. (Lynch-Wisconsin)
W78-03023

THE ROLE OF FILTER FEEDERS IN FLOWING WATERS,
Georgia Univ., Athens. Dept. of Entomology; and Georgia Univ., Athens. Inst. of Ecology.
J. B. Wallace, J. R. Webster, and W. R. Woodall.
Archiv fur Hydrobiologic, Vol 79, No 4, p 506-532, May 1977. 11 fig, 5 tab, 62 ref. DEB 74-00618 A01, BMS 74-12088 A01.

Descriptors: *Larvae, *Seston, *Particle size, Rivers, Streams, Georgia, North Carolina, Competition, Coastal Plains, Nutrients, Ecosystems, Diatoms, Food habits, Detritus, *Trichoptera, *Filter feeders, *Tallaluh River(GA-NC), *Altamaha River(GA).

Two study sites, a small headwater river and a large coastal plain river, were shown to have filter-feeding, net-spinning species of Trichopteran larvae present which feed on a range of drifting stream seston particle sizes. The sites chosen were the Tallulah River near the Georgia-North Carolina border and the Altamaha River near Baxley, Georgia. The study suggests that considerable selection pressure was placed on these organisms in regard to the type and size of food particles fed upon the diverse stream types by competition with other species. Such selection pressure would play a major role in strategies such as capture net mesh size variations, microdistributional patterns, and temporal variations in life cycles and net construction, which are used to achieve partitioning of food resources. It is noted that stream ecosystems have no mechanism for controlling inputs of materials and proposed that one control in such ecosystems is imposed by the fauna through regulation of outflow losses of nutrients. It is also suggested that the evolutionary diversity of filter feeders has resulted in tighter and tighter control on the entire stream ecosystem by conserving nutrient and energy losses in these unidirectional flow systems. (Coyle-Wisconsin)
W78-03024

CONSEQUENCES OF DETERGENT POLLUTION OF THE SEA: EFFECTS ON REGENERATING SPONGE CUBES OF GEODIA CYDONIUM,
Institut Rudjer Boskovic, Rovinj (Yugoslavia). Center for Marine Research.
R. K. Zahn, G. Zahn, W. E. G. Muller, I. Muller, and R. Beyer.
The Science of the Total Environment, Vol 8, No 2, p 109-151, September 1977. 11 fig, 3 tab.

Descriptors: *Detergents, *Water pollution effects, *Adsorption, Water pollution sources, Domestic wastes, Model studies, *Sponges, Thymidine, Uridine, Phenylalanine, Geodia sydonium, *Adriatic Sea.

Regenerating cubes of the sponge Geodia cydonium were used as a model in the investigation of detergent pollution in the sea. This sponge is found at the bottom of the Northern Adriatic sea in places that are relatively free of pollution and it reacts strongly to changes in ambient conditions, especially pollution. When cut into small pieces and kept under optimal conditions it will regenerate into a solid functional sponge. This cut up sponge in the state of regeneration is the basic model. The anionic detergent sodium dodecylsulphate (SDS) and a 1:1 mixture of Faks and Radion, two commercial laundry detergents, were used. It is shown that SDS is taken up, weakly accumulated but not incorporated into the macromolecular fractions of the sponge. At concentrations of 0.1 ppm and above, SDS decreases the uptake of thymidine, uridine and phenylalenine into the acid soluble sponge fraction. Their incorporation, which have been isolated, was different from the controls at 10 ppb and higher levels. Faks and Radion were less active by a factor of ten. However they showed similar effects. (Coyle-Wisconsin)
W78-03025

EXPERIMENTAL LAKES AREA AND CANADIAN LIMNOLOGY, (IN GERMAN),
Max-Planck-Inst. fuer Limnologie zu Ploen (West Germany).
W. Ohle.
Arch Hydrobiol 79(2), p 274-280, 1977.

Descriptors: Benthos, *Canada(Ontario lake area), Chaoborus, Chironomids, Chlorophyll, Humus, Ontario, Periphyton, Photosynthesis, Pisidium, Plankton, Pontoporeia, Zooplankton, Lakes, *Primary productivity.

Advances reported in Canadian fisheries publications show outstanding developments in limnology. The Experimental Lakes Area(ELA) comprises a group of 1004 lakes in northwestern Ontario (Canada). These lakes have very low levels of electrolytes but contain considerable humus derivatives and show the 1st primary production of phytoplankton. A new method for the determination of CO2 and another for assaying the chlorophyll content of the water were contributed. The maximal photosynthesis activity of the phytoplankton in these lakes averaged only 0.4 g C/mile2. In the series of P, Fe, N, etc., the nutrients were regulators of productivity on the basis of bioassays. There were also extensive reports on the periphyton, zooplankton and zoobenthos, especially pontoporeia, Pisidum, Chaoborus and chironomids. Copyright 1978, Biological Abstracts, Inc.
W78-03026

CARBON BUDGETS IN LAKE ONTARIO,
Canada Centre for Inland Waters, Burlington (Ontario).
M. N. Charlton.
Journal of Fisheries Research Board Canada, Vol. 34, No. 8, p 1240-1241, 1977. 1 tab, 3 ref.

Descriptors: *Lake Ontario, *Carbon, *Carbon dioxide, Carbon cycle, Primary productivity, Decomposing organic matter, *Primary carbon production, *Carbon budgets.

A 1975 carbon budget for Lake Ontario reported from an earlier study appears to indicate an approximate balance between inputs and outputs. The carbon inputs to the lake used in calculating the budget were inorganic and organic forms in rivers and lakes primary production. Carbon outputs considered were inorganic and organic forms in rivers, gaseous carbon dioxide exchange, precipitation and sedimentation. While the achievement of a balance appeared to lend some credibility to the various measurements, the inclusion of primary production as an input to these calculations unfortunately produces major error. Primary production processes move carbon from the dissolved inorganic form to a particulate organic form. The flux of carbon is from water to particles. Primary production alone is neither an input nor an output in a lake carbon budget and should be removed from the list of inputs. If this approach is taken, the annual budget of the earlier study does not balance. Approximately equal amounts of carbon enter and exit via rivers and what is striking is that the amount of carbon leaving the lake via gaseous exchange is equivalent to half the total lost by way of rivers. (Coyle-Wisconsin)
W78-03027

THERMALLY STRATIFIED ACID WATER IN LATE WINTER - A KEY FACTOR INDUCTING SELF-ACCELERATING PROCESSES WHICH INCREASE ACIDIFICATION,
Swedish Water and Air Pollution Research Lab., Gothenburg.
H. Hultberg.
Water, Air, and Soil Pollution, Vol. 7, No. 3, p. 279-294, March 1977. 13 fig, 1 tab, 13 ref.

Descriptors: *Snow, *Oligotrophy, *Lakes, Invertebrates, Microorganisms, Acidic water, Chemistry of precipitation, Precipitation(Atmospheric), *Ion separation, *Sweden, Sphagnum.

Annual variations in pH have been studied in lakes in two areas of southwestern Sweden: ten in the province of Bohuslan since late 1969, and three in the province of Varmland since 1973. It is concluded that through ion separation out of snow at an early state of snowmelting, acid substances cover the littoral bottoms of the lakes with a highly acid layer. This leads to poor fish reproduction and death among groups of invertebrates. It also induces a Sphagnum invasion and affects the microflora in both lakes and running waters already at an early stage of acidification. These biological disorders brought about by thermally-stratified acid water in late winter lead to oligotrophication which in turn accelerates the acidification process. Among the investigated lakes in Bohuslan, the yearly pH variation is greatest in summer with values around 5.2 to 5.5. In the very acid lakes the variations are small. In all lakes a sharp drop in pH occurred in the spring of 1970, following a winter of unusual snow. No snowmelting occurred until mid-April. pH was 4.4 to 4.5 in snow profiles in the area but the pH drop in lakes in the area was even greater. (Coyle-Wisconsin)
W78-03028

ABYSSAL MEIOBENTHOS IN THE BAY OF BISCAY: I. CONSIDERATIONS ON QUANTITATIVE DATA, (IN FRENCH),
Centre d'Oceanographie, Marseille (France). Station Marine d'Endoume.
For primary bibliographic entry see Field 5A.
W78-03030

EVALUATING AUTROPHICATION POTENTIAL FROM RIVER COMMUNITY PRODUCTIVITY,
Virginia Univ., Charlottesville. Dept. of Environmental Sciences.
G. M. Hornberger, M. G. Kelley, and B. J. Cosby.
Water Research, Vol. 11, No. 1, p. 65-69, 1977. 4 fig, 2 tab, 12 ref.

Descriptors: *Rivers, *Testing, *Dissolved oxygen, *Temperature, *Solar radiation, Trophic level, Low flow, Nutrients, *Productivity, Measurements, Streams, *Eutrophication potential, *Production-respiration ratio.

Measurements of dissolved oxygen, temperature and solar radiation were used to estimate net community production, respiration, gross production and the production-respiration ratio for six rivers during the summer of 1974. Data analysis and comparison with a subjective ranking of the eutrophy of the rivers based on nutrient and chlorophyll data, showed that productivity measurements in streams can be used to evaluate eutrophication potential. No single parameter or index provided reliable, but a discriminant analysis suggested that the use of respiration and the production-respiration ratio in conjuction can be useful. The degree of temporal variability of community metabolism was a consistently good indicator of water quality. It is suggested that the eutrophication potential of an unknown river can be determined by comparing several weeks of productivity data for summer, low-flow conditions with data presented in the paper. The paper notes also that if only physical and chemical measurements are made, then continuous measurements are made, then continuous monitoring of oxygen, temperature and radiation are important because they allow photosynthetic and respiration rates of the biota to be estimated without direct measurement of biological parameters. (Coyle-Wisconsin)
W78-03031

THE TOXIC ACTION OF ENDRIN ON AQUATIC INVERTEBRATES, (IN GERMAN),
J. Trnkova.
Prirodoved Pr Ustavu Cesk Akad Ved Brne 11(3), p 1-32, 1977.

Descriptors: *Endrin, *Invertebrates, *Toxicity, Water pollution effects, Absorption, Asellus-aquaticus, Caenis-robusta, Cloeon-dipterum, Culex-pipiens, Daphnia-pulex, *Insecticide, Larvae, Planaria -gonocephala, Pupa, Tubifex-tubifex.

The toxicity of endrin in form of the preparation Endrin 20 Spolana was determined for 23 spp. of aquatic invertebrates from stagnant and running waters. Of the tested stagnant water species, Daphnia pulex was the most sensitive, showing the toxicity value LC50 (72 h) of 8.10-9 mg/l at 20 degrees C.; Tubifex tubifex was the most resistant, with LC50 (72 h) of 21.11 mg/l at 20 degrees. Of the running water species, larvae of Caenis robusta were the most sensitive, with LC50 (72 h) of 1.1 . 10-8 mg/l at 14 degrees C.; Planaria gonocephala was the most resistant, with LC50 (72 h) of 0.1 mg/l at 15 degrees C. Juvenile Asellus aquaticus at the age of 1 wk were more resistant than those at the age of 2-4 wk the LC50 values for juveniles at 5 mo. were of the same order of magnitude as those for adults. The sensitivity of larvae of Cloeon dipterum to endrin was inversely proportional to age. Pupae of Culex pipiens were 10(2) times more resistant than 4th instar larvae, and 10(4) times more resistant than 3rd instar larvae. The age of prepared emulsion of the toxicant, the temperature of the emulsion as well as the absence of substrate in the testing vessels may affect the experimental results. Endrin is accumulated in tissues of certain aquatic invertebrates in amounts up to 100 times higher than the concentration of the testing emulsion, and can persist in the tissues for up to 4 mo.--Copyright 1978, Biological Abstracts, Inc.
W78-03034

TRACE ORGANIC EMISSIONS FROM LEAD MINING-MILLING OPERATIONS,
Syracuse Univ., NY. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5B.
W78-03036

A QUANTITATIVE STUDY OF THE STRUCTURE AND DYNAMICS OF BENTHIC SUBTIDAL ALGAL VEGETATION IN GHANA (TROPHICAL WEST AFRICA),
Ghana Univ., Legon. Dept. of Botany.
For primary bibliographic entry see Field 5B.
W78-03037

L OLIVIER LAGOON, (IN FRENCH),
Centre Univ. de Luminy, Marseille (France). Lab. du Histol. Morphogen. Anim.
M. Marilley.
Bull Ecol 7(3), p 267-274, 1976.

Descriptors: *Eutrophication, Lagoons, *Mullets, Dissolved oxygen, Nutrients, Phytoplankton, Water pollution effects, Decomposing, Organic matter, Hydrogen sulfide, *Cyanophyceae, Mortality, Salts, Water temperature, Weather, Zooplankton.

The physical, chemical and biological phenomena responsible for the death of a large number of mullet in 1967 were studied. Data on weather, water levels, water agitation, dissolved Oz and nutrient salts were observed. A combination of relatively calm waters, warm temperatures and the lack of exchange between this and an adjacent lagoon resulted in above normal phytoplanktonic blooms, especially near the bottom. Increased Cyanophyceae populations lead to reduced zooplanktonic levels and eventually caused the build up decomposing organic material, increased Oz deficit and high hydrogen sulfide levels resulting in a significant mortality rate of fish.--Copyright 1978, Biological Abstracts, Inc.
W78-03039

CHNSED: SIMULATION OF SEDIMENT AND TRACE CONTAMINATION TRANSPORT WITH SEDIMENT/CONTAMINANT INTERACTION,
Oak Ridge National Lab., TN.
For primary bibliographic entry see Field 5B.
W78-03057

CALCULATION METHODS IN THE HYGIENIC STANDARDIZATION OF CHEMICAL WATER CONTAMINATION, (IN RUSSIAN),
Moskovskii Gosudarstvennyi Meditsinskii Inst. (USSR). Dept. of General Hygiene.
For primary bibliographic entry see Field 5A.
W78-03063

PARTICULAR CHARACTER OF THE EUTROPHICATION MECHANISM IN THE ETANG DE BERRE, (IN FRENCH),
Centre d'Oceanographie, Marseille (France). Station Marine d'Endoume.
M. Minas, M. -C. Bonin, B. Coste, P. David, and H. -J. Minas.
Ann Inst Oceanogr 52(2), p 153-164, 1976.

Descriptors: *Eutrophication, Water pollution effects, Lakes, Brackish lakes, *Brackish water, Biomass, Chlorophyll, *France(Etang deBerre), Halocline, Marseilles, Mixing, *Nutrients, Phytoplankton, Vertical mixing.

Eutrophication processes in the brackish water of the Etang de Berre, small lake near Marseilles (France) was studied over a 1 mo. period particularly on nutrient distribution and phytoplankton biomass. The nutrient trap which characterized the estuarine circulation system of the lake is strongly modified under strong wind conditions. A breakdown of the halocline by vertical mixing provides a nutrient input in the photic zone inducing an extremely intense bloom of phytoplankton. The chlorophyll a and Oz saturation values reach respectively 50 micron g/l and 190%. This eutrophication provides an output of organic material to the open sea and constitutes a mechanism for reducing the general accumulation of organic and mineral material under the halocline.-Copyright 1978, Biological Abstracts, Inc.
W78-03065

PRIMARY PRODUCTION, ORGANIC MATTER DESTRUCTION AND BACTERIAL NUMBERS IN THE SARATOV RESERVOIR, (IN RUSSIAN),
Akademiya Nauk SSSR, Moscow. Inst. Biologii Vnutrennykh Vod.
A. N. Dzyuban.
Gidrobiol Zh 13(1), p 81-85, 1977.

Descriptors: *Primary productivity, Phytoplankton, Reservoirs, *Organic matter, *Bacteria, Biomass, Water pollution effects, Zooplankton, *Saratov Reservoir(USSR).

As a result of unfavorable hydrometeorological conditions in 1973, the phytoplankton in the Saratov Reservoir (Russian SFSR, USSR) was weakly developed and primary production was low. This fact and the intensive feeding of zooplankton caused a reduction in bacterial numbers. For the vegetation period of 1973 (180 days), primary production was 57 g/m to the second power, bacterial biomass production was 39 g/m to the second power and organic matter destruction was 110 g/m to the second power. The destruction/phytoplankton production ratio was 1.9, which is less than that in other bodies of water of the Middle and Lower Volga (USSR). Thus, primary production is important in organic matter supply and bacterial numbers and activity.-Copyright 1978, Biological Abstracts, Inc.
W78-03066

ENERGY FLOW MODEL OF AN OXYGEN-DEFICIENT ESTUARY ON THE SWEDISH WEST COAST,
Swedish Water and Air Pollution Research Lab., Gothenberg.
R. Rosenberg, I. Olsson, and E. Olundh.
Marine Biology, Vol. 42, p. 99-107, 1977. 4 fig, 34 ref.

Descriptors: *Carbons, *Energy, *Fjords, Model studies, Estuaries, Oxygen, Zooplankton, Primary productivity, Fish, Eutrophication, Water pollution, Ecosystems, Clams, *Oxygen, *Byfjords(Sweden), Sweden, Halocline, Mytilus edulis.

An energy flow (carbon flow) model was developed for a specific ecosystem, the Byfjord on the west coast of Sweden. The Byfjord is an almost nontidal, eutrophic, stagnant, oxygen-deficient estuary connected by a narrow sound to an adjacent fjord. A sill at 12 m virtually prevents water exchange below the halocline (12-15m), and creates anoxic conditions. Studies of fauna from 1970-73 showed that the estuary is characterized by high primary production, a well-developed meifauna (dominated by foraminifera and nematodes) compared to macrofauna, high epifaunal biomass, low number of herbivorous copepods, and small fish population. Meiofaunal number and biomass were negatively correlated with depth (Maximum at 5-8m) and oxygen concentration. Energy flow is defined as changes in biomass of a given area of the system expressed as energy per unit of time per unit of area. Biomass data was transformed into carbon. Some 25% of the annual primary production (300 metric tons carbon) is estimated to be directly consumed, and to produce 5 tons zooplankton carbon and 40 tons epifaunal (mainly Mytilus edulis) carbon. About 500 tons carbon from detritus are utilized in animal production, and produce about 5 tons zooplankton carbon, 6 tons meiofaunal carbon, and 3 tons benthic macrofaunal carbon. Fish production is about 0.3 tons carbon/year. (Lynch-Wisc)
W78-03067

DIRECT MEASUREMENT OF DISSOLVED ORGANIC CARBON RELEASE BY PHYTOPLANKTON AND INCORPORATION BY MICROHETEROTROPHS,
Georgia Univ., Athens. Dept. of Microbiology.
For primary bibliographic entry see Field 5A.
W78-03068

SOME RESULTS OF STUDIES ON THE CYCLE OF SUBSTANCES AND BIOLOGICAL SELF-PURIFICATION OF BODIES OF WATER, (IN RUSSIAN),
Akademiya Nauk SSSR, Moscow. Inst. Biologii Vunutrennykh Vod.
For primary bibliographic entry see Field 5G.
W78-03070

AUTOMATIC SORTING OF ZOOPLANKTON BY ISOPYCNIC SEDIMENTATION IN GRADIENTS OF SILICA: PERFORMANCE OF A 'RHO SPECTROMETER',
Rutgers - The State Univ., New Brunswick, NJ. Waksman Inst. of Microbiology.
For primary bibliographic entry see Field 5A.
W78-03071

BENTHIC FAUNA SPECIES DIVERSITY IN SIX CENTRAL FLORIDA LAKES IN SUMMER,
Florida Technological Univ., Orlando.
J. A. Osborne, M. P. Wanielista, and Y. A. Yousef.
Hydrobiologia, Vol. 48, No. 2, p. 125-129, 1976. 1 fig, 2 tab, 18 ref.

Descriptors: *Speciation, *Benthic fauna, *Trophic level, *Lakes, *Oligotrophy, Florida, Invertebrates, Water pollution, Water quality, Diptera, Dissolved oxygen, Eutrophication, Systematics, Macroinvertebrates, Banana Lakes(FL), Species diversity index.

A study of benthic macroinvertebrates in six of the Banana Lakes chain in central Florida showed that oligotrophic lakes can naturally contain few species with low species diversity values (d values here ranging from 0.735 to 1.731). This may be the rule rather than the exception for the benthic macroinvertebrate community in an oligotrophic lake. The lakes ranged in surface area from 2.8-18.2 ha, wiht maximum water depth of 3.0 m. Deep deposits of organically derived sediments were found at maximum depth in all lakes. Water temperature, light penetration, turbidity, dissolved oxygen, pH, inorganic and organic C, specific conductance, color, and chlorophyll were measured. All lakes showed 50% less dissolved oxygen at the bottom than at the surface; only small temperature variations were noted. Of 22 species collected, only four (all dipterans) were common to all six lakes. Species distribution and numbers varied greatly among the lakes. Dipterans dominated and were more uniformly distributed number of species ranged from 6 to 15 among the lakes. Species sensitive to dissolved oxygen levels and organic pollution, as well as tolerant species, were found in the lakes. (Lynch-Wisconsin)
W78-03072

EFFECTS OF A FRESHWATER EFFLUENT ON THE DEVELOPMENT OF BENTHIC COMMUNITIES IN A MARINE LAGOON, (IN FRENCH),
Centre d'Oceanographie, Marseille (France). Station Marine d'Endoume.
G. Stora.
Bull Ecol 7(3), p 275-282, 1976.

Descriptors: Hydroelectric powerplants, Marine lagoons, Benthos, Water pollution effects, Bivalves, Brackish water, Durance Channel(France), *Etang-de-Berre(France), Polychaetes, Salinity.

Since 1966, after installation of the Saint-Chamas hydroelectric plant, the Etang de Berre, (France), has received freshwaters of the Durance Channel. This important freshwater inflow representing approximately 4 times the volume of the lagoon during a year has considerably decreased the water salinity. Studies were made in 1965, 1970 and 1972 to follow the evolution of the benthic populations of the Etang de Berre. Charcterized by typical marine populations in 1964 (Bivalves, polychaetes), the studies in 1970 show a general degradation of the lagoon populations without substitution of benthic marine population by a brackish population. However, in 1972 the benthic populations were replaced on the littoral coast by a characteristic brackish benthic population.-Copyright 1978, biological Abstracts, Inc.
W78-03076

FINGER-FILL CANAL STUDIES, FLORIDA AND NORTH CAROLINA,
Environmental Protection Agency, Athens, GA. Surveillance and Analysis Div.
For primary bibliographic entry see Field 5G.
W78-03079

AN ECOLOGICAL STUDY OF THE EFFECTS OF POWER PLANTS ON BENTHIC MACROPLANT MICROCOSMS IN SUBTROPICAL AND TROPICAL ESTUARIES,
A. Thorhaug.
Available from the National Technical Information Service, Springfield, VA 22161 as ORO-4493 3, Price codes: A02 in paper copy, A01 in microfiche. Annual Progress Report No. ORO-4493-3: Energy and Research Development Administration - 1975 - 1976, May 1976. 22 p. E (40-1) - 9493.

Descriptors: *Water pollution effects, *Powerplants, *Environmental effects, *Thermal pollution, *Aquatic plants, Florida, Ecology, Benthos, Nuclear powerplants, Seagrass, Thalassia testudinum, Fossil fuel powerplants.

The effect of two fossil fuel and two nuclear plants on a near-shore seagrass community have been studied in South Biscayne Bay, Dade County, Florida over the past three years. The focus of the study has been to delineate the effects that a series of various pollutants have had on the dominant system of the seagrass, Thalassia testidinum, and its related community. The function of the seagrass community was studied and related to the impact of energy related activities, particularly, thermal effluent. In addition, the increased turbidity, current, siltation and heavy metals were factors at the Turkey Point site. Attempts were made to delineate the effect of heat in the laboratory to determine the upper thermal tolerance of the seagrass. This was shown to be quite close to the combined effect of all the pollutants in the field for Thalassia and the macroalgae. This would indicate that temperature is a very fundamental factor in the growth and survival of the seagrass community. (Sinha-OEIS)
W78-03094

THE RELATIONSHIP OF BACTERIOPLANKTON WITH PHYTO- AND ZOOPLANKTON IN FISH-REARING PONDS, (IN RUSSIAN),
Ukrainian Research Inst. of the Fish Industry, Kiev (USSR).
A. F. Antipchuk.
Gidrobiol Zh 13(1), p 78-80, 1977.

Descriptors: *Cyanophyta, *Eutrophication, *Bacterioplankton, Ponds, Water pollution effects, Algae, Algal growth, *Bacteria, Euglenoid, Nutrition, Plankton, Protococcal, Zooplankton.

A statistical evaluation of the quantitative development of bacterio-, phyto- and zooplankton in fish-rearing ponds with different types of blooms was conducted. There was an inverse correlation between bacterial and blue-green algal development, a strong direct correlation between bacterial and protococcal development and a weak direct correlation, independent of the type of bloom, between bacterial and euglenoid development. The relationship between bacteria and zooplankton was essentially a function of the dominant group of algae, with the massive development of blue-green algae resulting in an increase in the bacterial fraction of zooplankton nutrition.-Copyright 1978, Biological Abstracts, Inc.
W78-03097

RISK ANALYSIS METHODS FOR DEEPWATER PORT OIL TRANSFER SYSTEMS,
Transportation Systems Center, Cambridge, MA.
L. Frenkel, and W. T. Hathaway.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A029 329, Price codes: A07 in paper copy, A01 in microfiche. Coast Guard Office of Research and Development, Report No CG-D-69-76, June 1976. 144 p, 23 fig, 23 tab, 13 ref, 3 append. DOT-TSC-USCG-76-2.

Descriptors: *Coasts, *Estuaries, *Resources development, *Environmental effects, *Water pollution sources, *Water pollution effects, Wetlands, Water resources, *Outer Continental Shelf, *Deepwater ports, *Risk analysis, Oil transfer, Environmental impact.

The risk analysis is methodology for oil spills from the oil transfer systems in deepwater ports is presented. Failure mode and effect analysis in combination with fault tree analysis are identified as the methods best suited for the assessment of comparative risk from different technical alternatives. The necessary methodology and analytical expressions are developed and their application is demonstrated in some general sample calculations. Basic data sources are listed, and the quality of the data is discussed. It is shown that the available data are not sufficiently complete for quantitative calculations of the risk for the entire system. Comparative calculations, however, can be made, and a systematic qualitative examination of the system is possible. (Sinha-OEIS)
W78-03098

BASELINE STUDY PROGRAM, NORTH PUGET SOUND. BIOLOGICAL OIL IMPACT LITERATURE REVIEW: VOL I - TEXT,
Beak Consultants Inc., Portland, OR.
J. W. Buell, and V. W. Kaczynski.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-254 291, Price codes: A10 in paper copy, A01 in microfiche. Beak Consultants Inc., Report to Washington State Department of Ecology No WA/DOE/BR-75-01, October 1975. 204 p, 1 fig, 7 tab, 2 append.

Descriptors: *Baseline studies, *Oil pollution, *Water pollution effects, *Bibliographies, Environmental effects, Aquatic life, Washington, Reviews, *Outer Continental Shelf, *Ecological effects, *Biological effects, Puget Sound, Petrochemical pollutants.

Pertinent literature on the impact of oil upon the significant biological resources of Puget Sound is reviewed and analyzed. Possible effects of oil spills and spills of petrochemical products on the biota are considered. Interpretative data is summarized by organism and habitat. (Sinha-OEIS)
W78-03104

STUDIES AND INVESTIGATIONS OF THE FATE AND EFFECT OF THE SHELL OIL SPILL, PLATFORM B, BLOCK 26, SOUTH TIMBALIER BAY (DECEMBER 1, 1970 - NOVEMBER 30, 1971),
Resources Technology Corp., Houston, TX.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-257 598, Price codes: A06 in paper copy, A01 in microfiche. Environmental Protection Agency, Office of Water Programs, Oil and Hazardous Materials Program Series, Report No. OHM 72 05 001, January 1972. 1972. 118 p, 2 tab, 47 ref. Dedman, E.V. (ed.). EPA-68-01-0051.

Descriptors: *Oil spills, *Water pollution effects, *Environmental effects, Louisiana, *Outer Continental Shelf, Ecological effects.

A formal documentation of selected field study activities for one major spill incident which initially occurred offshore Louisiana on December 1, 1970

and lasted until April 16, 1971 is presented. The report is based on data and information obtained through three field surveys undertaken by the Environmental Protection Agency. The purpose of these field studies was to determine the areal extent of the spilled material, the fate of the spill, and the effect of the material on the biota. The three surveys were: The Caminada Bay - Barataria Bay physical, chemical and biological sampling conducted by EPA Region VI personnel assisted by the State of Louisiana; the offshore physical, chemical and biological sampling conducted by EPA regional personnel; Oceanographic and remote sensory survey; and the joint physical, chemical and biological sampling. (Sinha-OEIS)
W78-03106

A NUMERICAL OIL TRAJECTORY FORECAST MODEL USED TO ASSESS THE HAZARD TO LONG ISLAND BEACHES FROM OIL ENTERING THE NEW YORK BIGHT APEX FROM FEBRUARY 11-24, 1977,
Brookhaven National Lab., Upton, NY. Dept. of Applied Science.
For primary bibliographic entry see Field 5B.
W78-03109

TRACE METALS IN FINFISH FROM THE NEW YORK BIGHT AND LONG ISLAND SOUND,
National Marine Fisheries Service, Milford, CT. Milford Lab.
For primary bibliographic entry see Field 5B.
W78-03139

SELECTED AQUATIC PLANTS AS INDICATOR SPECIES FOR HEAVY METAL POLLUTION,
Bedford Inst. of Oceanography, Dartmouth (Nova Scotia); and Fisheries and Marine Service, Halifax (Nova Scotia). Dept. of Environment.
For primary bibliographic entry see Field 5A.
W78-03141

UPTAKE AND ACCUMULATION OF THE NICKEL ION BY MYTILUS EDULIS,
San Francisco Univ., CA. Dept. of Biology.
A. R. Friedrich, and F. P. Filice.
Bulletin of Environmental Contamination and Toxicology, Vol. 16, No. 6, p 750-755, 4 fig, 11 ref. 1976.

Descriptors: Environmental effects, *Water pollution effects, *Adsorption, *Mussels, *Nickel, *Ions, *Bioaccumulation, *Chlorides.

Investigations of the uptake and accumulation of nickel chloride by Mytilus edulis over a four week period showed that at total concentrations of 0.018 and 0.03 mg Ni/l, uptake and accumulation of nickel was not significant but that it was significant at concentrations of 0.056 and 0.107 mg Ni/l. Some mussels died during the course of the four weeks but it was concluded that there was no relationship between the number of deaths and the increasing concentrations of nickel. It was concluded that the accumulation of nickel by M. edulis may be due to an inadequate excretion of nickel. (Chilton-ORNL)
W78-03142

CLADOCERA (CRUSTACEA) AS INDICATORS OF WATER POLLUTION, (IN RUSSIAN),
For primary bibliographic entry see Field 5A.
W78-03144

TUNICATE SPECIES AS MARINE POLLUTION INDICATORS,
Democritus Nuclear Research Center, Athens (Greece). Chemistry Dept.
For primary bibliographic entry see Field 5B.
W78-03148

AVOIDANCE BY HERRING OF DISSOLVED COMPONENTS IN PULP MILL EFFLUENTS,
Fisheries and Marine Service, St. Andrews (New Brunswick). Biological Station.
D. J. Wildish, H. Akagi, and N. J. Poole.
Bulletin of Environmental Contamination and Toxicology, Vol 18, No 5, p 521-525, 1977. 3 tab, 7 ref.

Descriptors: *Pulp wastes, *Pollutant identification, *Fish behavior, *Herrings, Pollutants, Effluents, Environmental effects, Sodium compounds, Industrial wastes, Waste water disposal.

Herring, Clopea harengus, avoid whole sulfite pulp mill effluent (PME) at a threshold level equivalent to 2.5-2.9 mg/liter as sodium lignosulfonate. An attempt was made to identify the chemical components of PME that herring avoid in sea water. Groups of 9-13 herring were placed in a figure-eight maze and, except for control observations, the component tested was introduced into one end of the maze. The number of fish in each half of the maze was used as a measure of avoidance or preference. Only sodium lignosulfonate and humic acid were avoided at approximately 1 mg/liter. Nominal concentration thresholds estimated by interpolation were 0.1-0.3 mg/liter for sodium lignosulfonate and 0.1-0.2 mg/liter for humic acid. Herring apparently avoid long chain complex molecules, such as lignosulfonates, rather than relatively toxic resin acids and breakdown products of low molecular weight. The discrepancy with previous results using whole PME may be due to herring response to chemical differences in the two lignosulfonate samples tested or masking of lignosulfonate in PME by other chemicals present. (Snyder-FIRL)
W78-03194

5D. Waste Treatment Processes

EFFECTS OF WASTEWATER AND COOLING WATER CHLORINATION ON AQUATIC LIFE,
Environmental Research Lab., Duluth, MN.
For primary bibliographic entry see Field 5C.
W78-02749

POLLUTION OF LAKE MICHIGAN AND ITS TRIBUTARY BASIN, ILLINOIS, INDIANA, MICHIGAN, AND WISCONSIN.
Environmental Protection Agency, Chicago, IL. Region V.
For primary bibliographic entry see Field 5G.
W78-02828

TENSIONS AND CONFLICTS IN FEDERAL POLLUTION CONTROL AND WATER RESOURCE POLICY,
Environmental Defense Fund, New York. Eastern Water Resources and Land Use Program.
For primary bibliographic entry see Field 5G.
W78-02841

ADJUSTABLE FLOW FLOATING WEIR ASSEMBLY,
T. H. Morgan, and W. S. Posey.
U.S. Patent No. 4,015,629, 5 p, 2 fig, 7 ref; Official Gazette of the United States Patent Office, Vol 957, No 1, p 122, April 5, 1977.

Descriptors: *Patents, *Waste water treatment, *Water pollution control, Flow control, Equipment, *Weirs, Floating.

This weir assembly can be used to equalize the flow out of a basin which receives a variable input flow, while maintaining the ability to increase or decrease the output flow from the basin. An adjustable-flow floating weir assembly can therefore be of substantial benefit in the design of a waste water treatment facility by significantly reducing the maximum capacity requirements of the facility, thereby resulting in substantial savings. By varying the air under pressure acting on the underside of the weir assembly, the buoyancy of the assembly can be varied to correspondingly vary the vertical position of the assembly relative to the surface of the liquid in the basin and thereby regulate the output flow of liquid through the notches and through the weir assembly to the exterior of the basin. Thus, by maintaining a constant rate since the assembly would always have the same elevation relative to the liquid level in the basin. By increasing or decreasing the air pressure beneath the weir assembly, the vertical position of the assembly can be varied relative to the liquid level in the basin to thereby increase or decrease the constant rate at which liquid flows from the basin. (Sinha-OEIS)
W78-02892

METHOD FOR SEPARATING SOLID POLLUTANTS FROM FLUIDS,
Societe Lab. Saint Dider-au-Mont-d'Or (France).
J-F. Vicard.
U.S. Patent No. 4,017,390, 5 p, 3 fig, 9 ref; Official Gazette of the United States Patent Office, Vol 957, No 2, p 710, April 12, 1977.

Descriptors: *Patents, *Waste water treatment, *Water pollution treatment, *Water pollution control, Solid wastes, Suspended solids, Separation techniques, Centrifugation.

The water to be treated comes from a washing, dust removal or like installation and it contains polluting particles which are to be removed. In certain cases these particles have a commercial value and their recovery may be an advantage. The water is first sent fo a preparatory apparatus where it is made to whirl at high speed. It circulates in the form of a revolving mass, for example a cylindrical mass, comprising an axial vacuum and located in this vacuum is an electrode having an appropriate potential for causing the agglomeration of the particles. The centrifugal field is used simultaneously for removing the gases and foam as well as the floating particles from the water and for initiating purification by centrifugation. The fraction of partly purified water is returned for use. The water pre-treated in this manner is supplied to a concentrator inside which it continues to rotate, thus ensuring increased centrifugal concentration. The clear water leaving the central part of the concentrator is extracted and the muddy water is supplied to a filter forming a thickener. The filtered water is returned to the concentrator and the thickened sludge is sent to a lock chamber which is evacuated periodically by pneumatic effect. (Sinha-OEIS)
W78-02894

WATER TREATMENT SYSTEM,
For primary bibliographic entry see Field 5F.
W78-02895

POLLUTION MONITORING WITH TOTAL ORGANIC CARBON ANALYSIS,
Northeastern Univ., Boston, MA. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5A.
W78-03009

DEVICE FOR EVALUATING COALESCENCE OF OIL EMULSIONS,
Engineering-Science, Inc., Houston, TX.
J. Chieu, E. F. Gloyna, F. Asce, and S. Schechter.
Journal of Environmental Engineering Division, Proceedings of ASCE Vol. 103, No. 2, p. 163-175, April 1977. 11 fig, 1 tab, 17 ref.

Descriptors: *Waste water treatment, *Laboratory tests, *Coalescence, *Viscosity, *Laboratory equipment, *Oily water, Equipment, Oil wastes, Oil pollution, Emulsions, *Oil emulsion coalescence test apparatus.

A laboratory apparatus is described which can provide useful information in the design and operation of coalescers used to break stable oil-water emulsions, a problem in oil removal in wastewater treatment systems. The compact unit tests for important variables such as wettability of media, coalescer depth, flow rates, and characteristics of oily wastes, all of which can be investigated in detail before pilot plant facilities are planned. Treatability results show how removal of oil-water emulsions through coalescence can be accomplished. Among results of test data was that media preferentially wetted by the media will exhibit lower head losses than nonwetting media. Further, coalescence decreases with increasing filter velocity and decreasing interfacial tension. No significant difference in oil separation was found for the range of viscosities studied. (Coyle-Wisconsin)
W78-03032

DECONTAMINATING LAKE SUPERIOR OF ASBESTOS FIBERS,
Army Mobility Research and Development Command, Fort Belvoir, VA. Sanitary Sciences Div.
R. P. Schmitt, D. C. Linsten, and T. F. Shannon.
Environmental Science and Technology, Vol. 11, No. 5, p 462-465, May, 1977. 4 fig, 2 tab.

Descriptors: *Lake Superior, *Asbestos, *Mining, *Filtration, *Water purification, Water pollution, Water pollution control, Iron, Minnesota, Pollutants, Water pollution sources, Equipment, Industrial wastes, Coagulation, Human pathology, Human diseases, Potable water, ERDLator water purification unit, Taconite, Clarification, Carcinogens, Taconite.

Virtually all the asbestos was removed from a sample of water from Lake Superior previously polluted by discharges of wastewater and siliceous tailings which contained the mineral from a taconite concentration plant, by means of a U.S. Army-developed ERDLator water purification unit. Results of tests of the unit indicate that charge neutralization, bridging and filtration are the logical approach to asbestos decontamination of Lake Superior. During the tests (1973) the count of asbestos fibers in the lake water varied from 300,000 to 8,300,000 particles/l, 90% of which were 0.06-1.1 microns in length. The tiny particle size and electrical charge results in virtualy complete dispersion and minimal settling. Health hazards of asbestos in drinking water include mesotheliomas of the pleura or peritoneum with a 20-year incubation period. The water purification unit consists of a conical solids contact clarifier, pressure diatomite filter, and supportive equipment, including engine, generator, and storage tanks. Nine operation variations were tested. Best results were obtained with the following procedure: (1) coagulation: 2 ppm cationic polyelectrolyte added in ERDLator wet well; (2) filtration: precoat, 0.4 lbs celite 535; body feed, 28 ppm Hyflo. The positively charged cationic polyelectrolyte neutralized the negative charge on the suspended asbestos fibers; the neutralized particles were then aggregated or 'bridged' on the long-chain polymer, and aggregates were removed by the subsequent filtration step. (Lynch-Wisconsin)
W78-03040

THE FRENCH MARKET FOR AIR AND WATER PURIFICATION AND POLLUTION CONTROL EQUIPMENT.
Domestic and International Business Administration, Washington, DC.
For primary bibliographic entry see Field 5G.
W78-03042

FINANCIAL CRITICAL FACTORS ANALYSIS.
Miami Valley Regional Planning Commission, Dayton, OH.; and Linton and Co., Inc., Washington, DC.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-254 377, Price codes: A04 in paper copy, A01 in microfiche. Report No. EPA-208-MVRPC-M6, March 1976. 67 p, 1 fig, 11 tab, 7 ref, 2 append. P005160 01.

Descriptors: *Ohio, *Waste water treatment, *Financing, Waste water disposal, Regional development, Bond issues, Costs, Grants, Planning, Treatment facilities, *Miami Valley Regional Planning Commission(OH).

This review of methods available to Ohio municipalities and counties and the Miami Conservancy District for financing the construction of wastewater treatment facilities, is part of a series of eight reports giving background information for development of the management component of the Section 208 Areawide Water Quality Management Plan by the Miami Valley Regional Planning Commission. Factors were identified which affect the ability of finance treatment facilities, including methods of long-term financing available to public agencies, legal implications of such methods, current use level within those limits, voter reaction to bond issues, federal grant programs for water pollution control, state assistance for water pollution control, and mechanisms available to facilitate multijurisdictional wastewater treatment operations. Financing methods discussed included general obligation bonding, general obligation revenue or self-supporting bonding, straight revenue bonding, special assessment bonding, and contract financing. Ohio Water Development Authority (OWDA) and Farmers Home Administration (FHA) assistance was also reviewed. Conclusions were that where needs exist, appropriate financing methods are available, at both local and regional levels. For specific cases intensive analysis of the local situation is necessary to determine the best method and to estimate costs. (Lynch-Wisc)
W78-03052

WASTE NUTRIENT RECYCLING USING HYDROPONIC AND AQUACULTURAL METHODS,
California Univ., Los Angeles. Office of Environmental Science and Engineering.
J. A. Dracup, and R. A. Mah.
1975. 166 p, 58 fig, 249 ref, 9 append. RF 74070.

Descriptors: *Recycling, *Nutrients, *Hydroponics, *Aquaculture, *Waste water disposal, Model studies, California, Food chains, Algae, Reclaimed water, Social aspects, Daphnia, Channel catfish, Sewage disposal, Costs, Tapia Water Reclamation Facility(CA).

Hydroponics and aquaculture hold great potential for the producton of food and fiber as well as for wastewater treatment, pollution control, water reclamation, and nutrient recovery. Secondary effluent is here shown to be an adequate aquacultural growth medium for an artificial food chain consisting of freshwater algae, the crustacean Daphnia, and channel catfish. Using hydroponic techniques, chrysanthemums and tomatoes have been grown experimentally in reclaimed secondary effluent; peppers, eggplant, cucumbers, and lettuce are potential crops. The general uses of hydroponics and aquaculture in wastewater recycling are discussed, and public attitudes, health aspects, and legal and water quality considerations are analyzed. Simulation models for aquaculture and hydroponics operations are developed, and a proposed pilot plant is described, which utilizes the algae-crustacean-fish food chain and crop production in conjunction with the Tapia Water Reclamation Facility of the Las Virgines Municipal Water district at Calabasas, California. A 100,000 gal/day aquaculture facility would require a capital investment of $313,000 and annual operating costs of $106,745. A 1 MGD hydroponics operation could yield a net annual profit of $82,000 on a $499,046 capital investment and operating expenses of $159,000. (Lynch-Wisconsin)
W78-03077

COST REDUCTION FOR WASTEWATER TREATMENT UTILIZING WATER MANAGEMENT AT HOLSTON ARMY AMMUNITION PLANT,
DARCOM Intern Training Center, Taxarkana, TX. Product/Production Graduate Engineering Program.
For primary bibliographic entry see Field 6C.
W78-03085

THE CATALYTIC OXIDATION OF CYANIDES (DIE KATALYTISCHE LUFTOXIDATION VON ZYANIDEN),
A. T. Kuhn, and C. Wilson.
Oberflaeche-Surface, Vol. 18, No. 4, p 93-96, 1977. 3 fig, 20 ref.

Descriptors: Oxidation, *Nitrogen compounds, *Activated carbon, *Chemical wastes, Separation techniques, Industrial wastes, *Waste water treatment, *Cyanides, *Catalytic oxidation.

Atmospheric oxidation is an effective, inexpensive method for the elimination of cyanides from dilute solutions. The process is based upon the passage of the cyanide wastes and air through a column of carbon (charcoal) on an inert carrier. The direction of flow is intermittently reversed to allow a better distribution of the metallic hydroxides formed by this process, and the excess can be removed by flushing with hydrochloric acid solution. The cyanide ions are totally oxidized to carbon dioxide, ammonia, and nitrogen. The resulting increase in pH is favorable to the reaction in the range 5-9. Certain metallic ions, especially cadmium, inhibit or retard the reaction. Increased temperatures accelerate the reaction. The following carbons from various sources were studied using a solution containing 600 ppm cyanide in a period of 24 hr with 37.5 g carbon/liter and their percentage efficiency determined: coke, 67.5; sewage sludge, 93.4; spruce wood, 56.6; peat, 61.7. (Schwartz-FIRL)
W78-03158

INCINERATORS FOR WASTES FROM THE CHEMICAL INDUSTRY (INCINERATEURS DE DECHETS DE L'INDUSTRIE CHIMIQUE),
For primary bibliographic entry see Field 5E.
W78-03159

WASTE WATER, SLUDGES, AND SOLID WASTES OF CHEMICAL INDUSTRY--TREATMENT, INCINERATION, DUMPING (ABWASSER, SCHLAEMME SOWIE FESTE RUECKSTANDE DER CHEMISCHEN INDUSTRIE--AUBEREITEN, VERBRENNEN, DEPONIEREN),
Bayer A. G., Krefeld-Uerdingen (West Germany). Abt. Umweltschutz.
For primary bibliographic entry see Field 5E.
W78-03160

TREATMENT OF A CREAMERY EFFLUENT.
Effluent and Water Treatment Journal, Vol 17, No 9, p 476, September, 1977. 1 fig.

Descriptors: *Food processing industry, *Dairy industry, *Activated sludge, *Filtration, *Treatment facilities, Aeration, Effluents, Biochemical oxygen demand, Industrial wastes, Porous media, *Waste water treatment.

The North Cork Creamery in Kanturk, Bounty Cork, Ireland, produces waste water at rates up to 5000 gal/hr in the manufacture of casein. The waste water normally includes caustic soda, nitric acid, and trace amounts of oils and fats. Waste water treatment with two biofiltration stages followed by a single activated sludge stage was installed after the local government set a limit on

BOD discharge from the plant of 18 kg/day. Waste water from the creamery first undergoes coarse and fine screening and then passes through a series of grease traps. After equalization it passes through two high-rate biofilters which are filled with 7778 cu m of ICI Flocor. Sludge is collected in two sludge settling basins and then passes to a sludge holding tank. Two 7.5 hp aerators in the activated sludge reduce the BOD to a final concentration less than 20 mg/liter. The clarified liquor is discharged directly to the River Allow. The treatment system was designed and manufactured by Anderson and Martin Ltd. of Dublin in conjunction with Davenport Engineering Company Ltd. of Bradford, Ireland. (Schulz-FIRL)
W78-03161

SWEDISH POLLUTION CLEAN-UP.
Water Services, Vol 81, No 977, p 426-427, July, 1977.

Descriptors: *Chemical wastes, *Activated carbon, *Adsorption, *Organic wastes, Industrial wastes, Waste water treatment, Treatment facilities, Water pollution control, *Sweden.

The Chemviron Adsorption Service, supplied by Chemviron Ltd. of Hampton Wick, Kingston-on-Thames, Surrey, England, is being used by the BT Kemi chemical plant in Teckomatorp, Sweden, to treat 50,000 tons of industrial waste water polluted with phenolics and herbicides. Although operations at the chemical plant had been shut down in response to more stringent pollution requirements laid down by the Environmental Board of Sweden, treatment was still required for the 50,000 tons of chemical wastes in storage in a series of lagoons near the factory complex. The Chemviron Adsorption Service was installed within 14 days and currently is treating the effluent at a rate of 240 sq m/day. Treatment with carbon adsorption as well as maintenance, technical advice, and regular monitoring of the effluent are all provided as part of the service. (Schulz-FIRL)
W78-03162

CLARIFIERS KEY TO EXPANSION OF TENNESSEE EASTMEN WASTEWATER FACILITY.
Chemical Processing, Vol 40, No 6, p 22, May, 1977.

Descriptors: *Clarification, *Chemical wastes, *Aeration, Equipment, *Treatment facilities, Biochemical oxygen demand, Design data, Sludge treatment, Industrial wastes, *Waste water treatment, Tennessee.

Waste water treatment facilities at the Tennessee Eastman Company in Kingsport were expanded at a cost of $6 million to include three aeration basins, three clarifiers, an aerobic digester, and a post-aeration basin. Liquid wastes are generated at a rate of 500,000 lb per day in the manufacture of over 350 fiber, chemical, and plastic products. Although approximately 72% of the wastes is isolated and incinerated, the remaining 28% must be treated. The three 120-ft dia clarifiers receive effluent from the aeration basins for settling of solids which consist largely of biologically active organisms. The clarifiers were designed for rapid sludge removal and are equipped with uptake pipes and alternate rake and deflector blades. BOD in the overflow from the clarifiers has been reduced by better than 95% and further additions are planned for the facility to reduce the BOD by 99%. Facilities at Kingsport prior to the expansion included a neutralization system, settling lagoon, and two aeration basins. (Schulz-FIRL)
W78-03163

CATALYTICALLY ASSISTED OXIDATION PROCESSES,
Rohrer A.G. (Switzerland). Lab.
E. Rohrer.
Chemistry and Industry, Vol 20, p 816-821, October, 1977. 7 tab, 28 ref.

Descriptors: *Chemical wastes, *Catalysts, *Chemical reactions, *Oxidation, *Chemical oxygen demand, Sewage treatment, Industrial wastes, *Waste water treatment.

Catalytically assisted oxidation mechanisms and their controls for reactions during sewage treatment are described for those situations in which the oxygen is reduced through the substrate partly or completely to water (non-insertion reactions), or in which the oxygen enters into a compound with the substrate (insertion reactions). Since the point of oxygen insertion in a compound is dependent on the strength of the bond which must be broken, dissociation energies and dissociation reactions are given for oxidation reactions encountered in sewage treatment. The initial stage of the reaction involves the formation of free radicals and the accumulation of peroxides. Since the cleavage of the hyperperoxides is an oxidation-reduction reaction which requires a catalyst, types of catalysts used for oxidation processes are discussed. The catalytic activity of activated carbon in sewage treatment is evaluated. Oxidation efficiency is defined as a parameter for estimating the performance of oxidation in terms of total organic carbon or COD. (Schulz-FIRL)
W78-03164

EPA DEVELOPS PROCESS TO DESTROY KEPONE,
For primary bibliographic entry see Field 5E.
W78-03165

SUPER BUGS RESCUE WASTE PLANTS.
Chemical Week, Vol 121, No 22, p 47, November, 1977. 1 fig.

Descriptors: *Bacteria, *Oil wastes, *Phenols, *Biological treatment, Treatment facilities, *Chemical wastes, Industrial plants, Bacteria, Waste treatment, Industrial wastes, *Waste water treatment.

Tailor-made, mutant bacteria strains can handle difficult jobs in waste treatment, including the breakdown of complex hydrocarbons. When the Mobay chemical plant in New Martinsville, West Virginia, was shut down because of a fuel shortage, bacteria used in the waste treatment plant died. Efforts to reseed the plant with bacteria from other plants failed. Phenobac, a mutant bacteria strain developed by Worne Biochemicals of Berlin, New Jersey, was added to the treatment system at a rate of 1 lb/mgd. Within three weeks after Phenobac was added, the plant again achieved 90% removal. Bacteria developed by Worne Biochemicals are available through the Polybac Corporation of New York, New York. Polybac bacteria have been used in the treatment of cellulose fats, greases, detergents, inks, dyes, cyanides, and hydrocarbons from various industrial operations. The mutant bacteria have been used in pilot-scale studies with a fluidized bed-bioreactor for the treatment of coal conversion wastes. (Snyder-FIRL)
W78-03166

TREATMENT OF SOLID EFFLUENT FROM A BICHROMATE PLANT FOR PREVENTION OF WATER POLLUTION,
Indian Inst. of Tech., Madras. Dept. of Chemical Engineering.
K. R. Rao, and C. S. Rao.
Indian Chemical Journal, Vol 12, No 2, p 27-28, August, 1977. 4 tab.

Descriptors: *Industrial wastes, *Chemical wastes, *Chemical industry, *Waste water treatment, *Solid wastes, Water pollution, Pollution abatement, Chemicals, Rain water, Leaching, Chromium, Chemical reactions, Carbonates.

Sodium dichromate is produced during the treatment of chrome ore with sodium carbonate addition and water leaching to remove the soluble sodium chromate. In actual operation, the leached out solid mass from the rotary kiln still contains residual soluble chromate. Studies were undertaken to reduce the water soluble hexavalent chrome ion by washing the solid waste with sodium carbonate solution. Sodium carbonate solutions in concentrations of 1, 5, and 10% were added to the waste which was then reheated in a muffle furnace to 1100C. The 5% solution reduced 100% of the hexavalent chromium in the waste material which had been heated for one hour and 98.4% of the chromium in a sample which had been heated for two hours. A countercurrent system of carbonate leaching is recommended for concentration of the chromate solution to reduce the load on evaporators. (Snyder-FIRL)
W78-03167

SEWAGE SLUDGE COMBUSTION.
For primary bibliographic entry see Field 5E.
W78-03168

AUTOMATIC MEASUREMENT OF TOTAL OXYGEN DEMAND APPLIED TO THE CONTROL OF WASTE WATERS (LA MESURE AUTOMATIQUE DE LA DEMANDE TOTALE EN OXYGENE APPLIQUEE AU CONTROLE DES EAUX RESIDUAIRES),
Montpellier-2 Univ. (France). Lab. de Genie Chimique, Traitement et Epuration des Eaux.
For primary bibliographic entry see Field 5A.
W78-03169

FLOTATION CELLS FIND USE IN WATER POLLUTION CONTROL.
Plant Engineering, Vol 31, No 23, p 90, 94, November, 1977.

Descriptors: *Flotation, *Food processing industry, *Separation techniques, *Froth flotation, *Industrial wastes, Clarification, Pilot plants, Waste water treatment.

The Wexler Meat Company in Chicago, Illinois, was required to comply with a new sewage and waste control ordinance imposed by the Metropolitan Sanitary District of Greater Chicago on meat packing, food processing, and manufacturing plants. Effluents sampling and a series of tests on a small pilot flotation cell were conducted by the Denver Equipment Division of Joy Manufacturing Company to determine the size and type of flotation unit which would provide optimum treatment for the Wexler facility. A 6000-gal wooden retention tank was chosen for treatment of all effluent from the nightly clean-up drains. The effluent is agitated and pumped to a series of four dispersed air flotation cells. The flotation processes are assisted by the addition of a reagent to the first cell. The dispersing mechanisms contain a rotating impeller which draws air through a vertical standpipe, mixes it with the liquid, and saturates it with fine bubbles. Nonwettable impurities adhere to the surface of the bubbles and rotating skimmers remove the resulting froth from the water. The system, which treats up to 6000 gal of effluent daily in a 2.5-hr treatment cycle, was installed at a cost of $7000. (Schulz-FIRL)
W78-03170

RECOVERY AND REUSE OF WASTES FROM ORGANIC CHEMICAL INDUSTRIES,
K. C. Shroff, and P. R. Sheth.
Indian Chemical Journal, Annual Number, p 79-84, 1977.

Descriptors: *Water reuse, *Recycling, *Chemical wastes, *Pesticides, *Industrial wastes, Activated carbon, Adsorption, Separation techniques, Centrifugation, Membrane processes, Ion exchange, Organic compounds, Soil-water-plant relationships, *Waste water treatment, Waste water disposal, *Organic wastes.

Various aspects of the recovery and reuse of water and chemicals from waste water produced during the manufacture of various organic chemicals in India are discussed. Water and waste management practices are discussed with respect to their cost-benefit ratios. Activated carbon adsorption is evaluated for use with organic compounds. The use of evaporation is described for the recovery of acids, alkalis, and salts. Solvent extraction and distillation are examined for the recovery of acids, alcohols, and organic solvents. Centrifugation is presented as a separation technique for oil or organic solvents from water, or for the separation of suspended particles of pesticides like DDT and BHC from waste water. Reverse osmosis and ion exchange are described as membrane processes in waste water treatment for industrial chemicals. Case studies on the recovery and treatment of liquid and gaseous wastes are presented for an oxalic acid plant and a malathion plant. Limitations on the reuse of fully and partially treated industrial wastes are discussed. (Schulz-FIRL)
W78-03171

WATER TREATMENT CAN TURN YOUR DRAINS INTO MAINS,
D. Martin.
Process Engineering, p 24-25, February, 1977.

Descriptors: *Effluents, *Industrial wastes, *Metal wastes, *Costs, *Food processing industry, Treatment facilities, Industrial water, Waste water treatment.

Increasing costs for water and waste water treatment have led to the development of advanced means of waste water treatment for industrial wastes which include some degree of water reuse. Charges for water and waste water treatment are discussed with respect to a variety of British industries, including textiles, food processing, metals plating, and slaughterhouse operations. Experiences with the use of Permutit-Boby waste water treatment equipment are described. The 1670-cu-m/day treatment unit at a frozen vegetable processing plant included flow balancing, primary settlement, high rate plastic media filtration, activated sludge, sludge thickening, dewatering, tertiary filtration, and chlorination. Daily savings produced by reuse of 50% of the waste water returned the capital cost for the facility within 540 days. A Permutit-Boby automatically controlled demineralizing plant is being used to remove the scale- and corrosion-forming impurities from boiler water at a truck and tractor plant in Liverpool, England. A Permutit-Boby effluent treatment plant with manual controls is being used to treat wastes at a metal plating plant. (Schulz-FIRL)
W78-03172

RECOVERY OF USEFUL BY-PRODUCTS FROM DISTILLERY WASTES,
Indian Engineers Ltd., New Delhi.
For primary bibliographic entry see Field 5E.
W78-03173

MEMBRANE PROCESSES FOR EFFLUENT TREATMENT,
Paterson Candy International Ltd., Whitchurch (England).
D. Pepper.
Chemistry and Industry, No. 20, p 834-836, October, 1977. 3 fig, 4 tab, 6 ref.

Descriptors: *Membrane processes, *Reverse osmosis, *Filtration, Municipal wastes, *Food processing industry, Chemical wastes, Chemical industry, Oil wastes, Sewage treatment, Separation techniques, Industrial wastes, *Waste water treatment.

Reverse osmosis uses a thin plastic film which allows water to flow through it under pressure but which prevents the passage of dissolved substances. Ultrafiltration uses a more open membrane which allows inorganic salts and small molecules to pass through with the water and excludes larger molecules. Reverse osmosis and ultrafiltration membranes are available as tubes, flat sheets, and hollow fibers. Reverse osmosis is being used to remove lactose and protein from whey produced during cheese manufacturing. Reverse osmosis is also being evaluated for reducing the volume of potato processing waste water. Reverse osmosis is used in sugar processing to remove 6 cu m/hr of water from a molasses fraction containing 6.2% total solids. A chemical factory uses reverse osmosis to separate effluents into water suitable for discharge and a concentrate for incineration. Ultrafiltration is being used to concentrate soluble oil emulsions. A pilot-scale reverse osmosis plant in Portsmouth, England, has produced potable quality water and a nutrient-rich compost from municipal waste water. (Snyder-FIRL)
W78-03174

TREATMENT OF HIGH-ORGANIC WASTE WATERS FROM THE FOOD INDUSTRY,
Research Inst. for Water Resources Development, Budapest (Hungary).
I. Tookos.
Effluent and Water Treatment Journal, Vol 17, No 9, p 449-459, September, 1977. 5 fig, 3 tab, 11 ref.

Descriptors: *Biological treatment, *Food processing industry, *Activated sludge, Dairy industry, Organic matter, Organic wastes, Waste water(Pollution), Industrial wastes, *Waste water treatment, Waste water disposal.

Experiments using activated sludge to treat waste water containing organics in high concentrations are reviewed. Effluents from meat and poultry processing, wheat starch factories, and dairies were used in batch and continuous models which had been seeded with municipal activated sludge. The waste water components and the behavior of dissolved colloidal and suspended pollutants controlled the nutrient removal and the amount of activated sludge produced. The amount of blood and fat affected the treatment system's oxygen demand with meat and poultry processing wastes. Measurements on effluents from starch factories indicated the presence of several complex organic substances, which caused a high oxygen demand for extended periods. The quantity of whey in the dairy waste water influenced aeration requirements for COD removal. When the differences in experimental conditions and the properties of waste water components are considered, these results compare favorably with previous data. (Snyder-FIRL)
W78-03175

TREATING WASTEWATER FOR RECYCLING,
Ecodyne Corp., Union, NJ. Industrial Wastewater Div.
G. Mace.
Plant Engineering, Vol 31, No 22, p 101-104, October, 1977. 2 fig, 3 tab.

Descriptors: *Water reuse, *Recycling, *Tertiary treatment, Equipment, Analytical techniques, Reverse osmosis, Filtration, Ion exchange, Flocculation, Industrial wastes, Industrial water, Waste water treatment.

Stricter environmental regulations and increasing water and sewage treatment costs have prefaced this discussion of the reclamation of industrial waste water for production processes and cooling. A flow scheme is presented to describe how much water should undergo treatment for reuse and where it should be reused. Primary, secondary, and tertiary levels of waste water treatment are described. Factors which influence the feasibility of waste water reuse are related to the relative effects of suspended solids, water temperature, dissolved solids, oily wastes, and process modifications to reduce overall water consumption. Capital costs, installation costs, and operating expenses are discussed with respect to equipment selection. Standard clarifiers, flocculators, and solids-contact flocculators which are used to remove suspended solids in most waste water treatment systems are described. Granular media filters are recommended for further treatment of clarified effluents, and the effects of media type, size, and filter design are examined. A cost analysis is presented for recycling 90%, 50%, and 0% of the waste water produced at a typical plant. Typical space requirements for recycling are described. Recycling operations at the Armco Steel Corporation plant in Houston, Texas, are described. (Schulz-FIRL)
W78-03176

SPECTROSCOPIC DETERMINATION OF METALS IN WASTEWATERS (PRIMENENIE METODA POLYAROGRAFII S NAKOPLENIEM (INVERSIONNOI VOL'TAMPEROMETRII) V ANALIZE MAKRO I MIKROOBEKTOV),
For primary bibliographic entry see Field 5A.
W78-03177

THE COLLECTION, NEUTRALIZATION, AND DISPOSAL OF RINSE WATER,
Armco Steel Corp., Kansas City, MO.
J. K. Fuller.
Wire Journal, Vol 10, No 1, p 60-63, January, 1977. 8 fig.

Descriptors: *Neutralization, *Chemical wastes, *Acidic water, *Treatment facilities, *Oxidation, Waste water disposal, Iron compounds, Industrial wastes, Waste water treatment.

The Union Wire Rope Division of Armco Steel Corporation in Kansas City, Missouri, produces a wide variety of products from high-carbon rods in its rod cleaning and wire coating operations. The plant is located on a portion of the Bid Blue River, into which the Missouri Clean Water Commission has prohibited the discharge of even treated industrial waste waters. The Kansas City Pollution Control Department had agreed to accept the discharge of Armco's waste water into the municipal treatment system, provided that the acidic rinse waters were neutralized and all ferrous iron had been oxidized to ferric iron. The proposed treatment system for Union Wire included rinse water collection, equalization, neutralization, aeration, and discharge to a large-diameter reinforced concrete municipal sanitary sewer that passed through the plant. A sampling program was instituted to determine the chemical and hydraulic loading on the proposed plant with monitoring for pH, free acidity, total acidity, and dissolved metals in waste water from various sources within the plant. Neutralization of the acidic waste water was accomplished with a 50% sodium hydroxide solution. Rising costs for sodium hydroxide eventually led to the use of a carbide lime slurry, a waste by-product from the production of acetylene gas, for neutralization. (Schulz-FIRL)
W78-03178

THE EFFLUENT TREATMENT SYSTEM OF THE ZAPOROZHE REFRACTORIES PLANT,
I. G. Kal'chik, and A. M. Levin.
Refractories, Vol 17, Nos 3-4, p 217-219, January, 1977. 2 fig, 3 tab.

Descriptors: *Treatment facilities, *Metals, *Sludge treatment, Effluents, Industrial wastes, Coagulation, Neutralization, *Waste water treatment, *USSR.

Waste water treatment facilities went into operation at the Zaporozhe Refractories Plant in the USSR in September 1973. The treatment system handles industrial wastes from the plant in addition to the initial, more highly polluted fraction of storm water which enters the collection system.

Characteristics of the 6000 cu m/day of waste water generated at the plant are presented. Industrial wastes and storm water are combined and pumped to a cascade mixing tank, where aluminum sulfide and lime are added for coagulation in a horizontal settling tank. The clarified effluent is discharged to the Panskaya Ravine. The settling tanks are equipped with scraper mechanisms which were adjusted to travel at a speed of 6 m/hr. Filter presses are used to dewater the sludge to a final moisture content of 45-50% and a cake thickness of 8-10 mm. Characteristics of the effluent before and after treatment are presented. (Schulz-FIRL)
W78-03179

SLUDGE RECLAMATION.
For primary bibliographic entry see Field 5E.
W78-03180

WE'RE GOOD BOYS NOW--BUT CAN WE STAY IN BUSINESS,
Gameson (Thomas) and Sons Ltd., Cannock (England).
J. W. Barrett.
Product Finishing, Vol. 30, No. 3, p 8-12, March, 1977. 5 fig.

Descriptors: *Acids, *Nitrogen compounds, *Chemical precipitation, *Neutralization, *Metals, Treatment facilities, Europe, Effluents, Industrial plants, Industrial production, Industrial water, Industrial wastes, *Waste water treatment, Waste water disposal.

Thomas Gameson and Sons Ltd's experiences with developing a reasonably satisfactory method of effluent treatment for metal finishing wastes are described. The alkaline outfall of cyanide-bearing washwaters is mixed with sodium hypochlorite and then used to partially neutralize the acid outfall. Although the system worked well for 3 months, chemical precipitation then increased greatly in direct proportion to the increase in iron in the pickle tanks. The optimum pH for settling out metals was 9.8, but this also resulted in considerable scaling. Changing the caustic dosing system to provide a final uniform pH of 7.0 to match the pH in the settling basins resulted in water suitable for recycling. The authorities failed to sea that increases in costs accompanying the Deposit of Poisonous Wastes Act fell simultaneously across all dischargers of effluent. A high-pressure filter press is used to dewater the sludge. (Snyder-FIRL)
W78-03181

ALUMINUM SWARF.
Water and Waste Treatment, Vol. 20, No. 9, p 48, September, 1977. 1 fig.

Descriptors: *Aluminum, *Metals, *Industrial wastes, *Filtration, Treatment facilities, Filters, Suspended solids, *Waste water treatment, Waste water disposal.

A 60-cm plate and frame filter has been used by Rank Xerox Ltd. in Mitcheldean, Gloucestershire, England, to reduce the level of solids in the industrial waste water to 11 mg/liter. The effluent from vibratory deburring to clean aluminum castings for copying machines averages nearly 2,800 mg/liter suspended solids before filtration. Filtration lowers the level of heavy materials in suspension from an average of 0.93 mg/liter to an average of 0.19 mg/liter and reduces chemical oxygen demand (COD) from 328 mg/liter to 47 mg/liter. The filtered water can be recycled for process water in the plant. The standard Carlson 60-cm kieselguhr filter, with 20 plates and frames, runs for 8.5 hours continuously each day, discharging 400-500 gph. Two 60-cm sheet filters were previously installed for final polishing after settlement of treated waters from electroplating processes. (Snyder-FIRL)
W78-03182

EFFLUENT TREATMENT: THREE CASE HISTORIES.
Product Finishing, Vol. 30, No. 4, p 46-47, April, 1977.

Descriptors: *Metals, *Industrial wastes, *Toxicity, *Suspended solids, *Separation techniques, Chromium, Oxidation, Chemical precipitation, Treatment facilities, *Waste water treatment.

The design and operation of three treatment plants were described and their effluents were characterized. One plant handles the wastes from an electronic components manufacturer. The effluent contains cyanide and hexavalent chrome VI. A cyanide oxidation-chrome reduction system was designed to incorporate downstream neutralization and solids removal by dissolved air flotation, and to dewater sludge. The acid/chrome and the alkali/cyanide streams each had a flow of 5000 gph. The final effluent produced had a pH range of 6 to 10, a maximum suspended solids level of 100 ppm, a maximum toxic metals level of 10 ppm, a maximum chromium VI level of 0.5 ppm, and a total CN- maximum level of 1.0 ppm. Another plant treats the chrome, cyanide, and acid swills from an electroplating works having a 1500 gph effluent flow. Sodium bisulfite reduces chrome dumps to chrome III. Chrome swills are reduced by sodium dithionite; cyanide dumps and swills are oxidized with hypochlorite. The final effluent, after neutralization, settlement and filtration, is free of cyanide and toxic metals. A third treatment plant, operating continuously with a 6000 gph flow, was designed for a plating company. It removes about 500 ppm of suspended solids and precipitates and removes soluble toxic metal contaminants, to produce a final discharge containing less than 40 ppm of suspended matter, and less than 10 ppm of total toxic metals. The acid swills flow to a neutralization tank for metal hydroxide formation and solids deposition. The effluent then undergoes solid-liquid separation and the clear liquor is discharged. The sludge is filter pressed for disposal. Small treatment systems of this type can be planned and implemented within a short period. (Kutcher-FIRL)
W78-03183

TREATMENT SYSTEM FOR OILY WASTES.
Water and Pollution Control, Vol. 115, No. 10, p 28, October, 1977. 1 fig.

Descriptors: *Oily water, *Flotation, *Separation techniques, *Suspended solids, *Industrial wastes, Food processing industry, Pulp and paper industry, Separation techniques, Equipment, Colloids, Oil wastes, *Waste water treatment.

The Favair dissolved air flotation system has been developed by the Permutit Company, Inc. of Paramus, New Jersey, for separating suspended particles and colloidal materials in waste streams. Areas of application include treating oily wastes, food processing, pulp and paper processing, latex manufacturing and biological wastes. Efficiencies for removal of suspended materials typically range from 80 to 90%. Liquid waste is pressurized at about 50 lbs/sq in and aerated in a retention tank. The liquid is then released to a flotation tank at atmospheric pressure. The air forms microscopic bubbles which attach to suspended particles and rise to the surface. Scrapers then remove the solids from the liquid surface, leaving clarified waste water at the bottom of the flotation tank. The Favair system provides up to double the capacity of conventional flotation systems and is available in capacities of 50-4,500gpm. (Snyder-FIRL)
W78-03184

SURFACE PROPERTIES OF PETROLEUM REFINERY WASTE OIL EMULSIONS,
Carnegie-Mellon Univ., Pittsburgh, PA. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5A.
W78-03185

ROTATING DISC WASTE TREATMENT SYSTEM MAKES LOW HP DEMANDS, OCCUPIES 1/3 THE SPACE OF PONDS,
Lion Oil Co., Martinez, CA. Avon Refinery.
J. F. Dehnert, and K. Robe.
Chemical Processing, Vol 40, No 12, p 64-66, November, 1977. 1 fig.

Descriptors: *Biological treatment, *Trickling filters, *Oil wastes, *Activated sludge, *Oil industry, Flotation, Aerobic treatment, Filters, Separation techniques, Industrial wastes, Pilot plants, Treatment facilities, Biological treatment, *Waste water treatment.

Pilot plant studies were conducted in 1972 to evaluate three waste water treatment systems for the Lion Oil Company's Avon Refinery in Martinez, California. An activated sludge facility, a 21-ft trickling filter, and a 7-gpm RBS (Rotating Biological Disc) system were the three pilot units compared. Previously existing treatment facilities for initial solids and surface oil removal included API/DAF settling/skimming channels and dissolved air flotation; a foul water stripper removed H2S and NH3. Some biological treatment had been provided by a 20-acre aerated surge pond and a 108-acre bio-oxidation pond. The 12 newly-installed RBS units have thin polyethylene discs which rotate axially on a shaft through the waste water so that 40% of the disc surface is submerged. The biomass on the disc surface removes COD, BOD, and suspended solids. Dual media filters further polish the treated water before discharge into Suisun Bay. Alkali treatment in sour water strippers with alkali addition is used to remove ammonia. Since pilot plant studies with the RBS system did not completely eliminate the toxicity of the effluents to fish, a single-use powdered activated carbon adsorption system was incorporated into the $5.3 million treatment facility. The RBS units operate at 1/10th the hp required for conventional biological systems and require only 1/3 of the area needed for comparable activated sludge system. (Schulz-FIRL)
W78-03186

TREATING EFFLUENTS FROM WATER AND LEMONADE BOTTLING INDUSTRIES BY HIGH STRENGTH BACTERIAL BEDS (TRAITABILITE DES EFFLUENTS DE L'INDUSTRIE DES EAUX ET LIMONADES PAR LITS BACTERIENS A FORTE CHARGE),
L. Vandevenne, and A. Dubois.
La Tribune du Cebedeau, Vol 30, No 401, p 157-164, April, No. 1977. 7 fig, 5 tab, 8 ref.

Descriptors: *Food processing industry, *Biological treatment, *Biochemical oxygen demand, *Biodegradation, *Filtration, Industrial wastes, Sludge digestion, *Waste water treatment.

A study was carried out at a pilot plant to determine the parameters for a high-strength bacterial bed and to establish whether it could be applied to pretreat wastes before sewer discharge or be used as a first stage for complete biological treatment to purify wastes according to legislative standards. Spent waters from the soft drink industry are composed mainly of bottle prewash waters, and bottle rinse waters. To them are sporadically added rinse waters from beverage and bottling processes and discharges from sodium baths. The characteristics of these effluents are presented. Results of the study showed that these effluents are easily purified by plastic bacterial beds, after correcting for pH and lack of nitrogen. Under trial conditions 85% purification was achieved for a loading of one kg BOD5 per cu m per day; at 3 kg BOD5 per cu m per day the efficiency was 60%. Sludge produced from the beds must be digested aerobically or anerobically before removal. (Blits-FIRL)
W78-03187

NEW ASPECTS OF CLOSED-UP PAPERMAKING SYSTEMS,
Sulzer Bros. Ltd., Winterthur (Switzerland).
B. Morgeli, and L. Pelloni.
Pulp and Paper Canada, Vol 78, No 10, p T227-T230, October, 1977. 6 fig, 12 ref.

Descriptors: *Recycling, *Water reuse, *Pulp and paper industry, *Effluents, *Pulp wastes, Tertiary treatment, Filtration, Desalination, Industrial wastes, Industrial water, Waste water treatment, Corrosion control.

Closed-circuit processes have been used in the pulp and paper industry as a means of reducing the quantity of wastes requiring disposal and of recovering valuable substances in the waste water. Waste treatment at a paper/board plant can involve primary treatment for recovery of water to be used in feed preparation; secondary treatment for recovery of fibers, filters, and additives; and tertiary treatment for reuse of the residual effluent. Advantages and disadvantages of adding tertiary treatment are discussed. Desalination must be provided to reduce the corrosivity of recycled water. Biological activity may be controlled by temperature, salinity, the use of biocides, and the elimination of nutrients. The integration of a tertiary circuit into an existing plant with primary and secondary circuits is described. Volumetric filtration by granular media was chosen as the method for eliminating residual solids and collids. Caking on the filter by long paper fibers was eliminated by the addition of microstraining prior to filtration. (Schulz-FIRL)
W78-03188

WATER TREATMENT AND RECYCLING IN A PAPER MILL (RECYCLAGE ET TRAITEMENT DES EAUX DANS UNE PAPETERIE),
G. Guillaumou.
La Technique Moderne, No. 1, p 35-38, January, 1977. 2 fig.

Descriptors: *Pulp and paper industry, *Recycling, Water pollution control, *Pulp wastes, *Water reuse, Clarification, Flocculation, Industrial water, *Waste water treatment.

A paper mill which discharged to a river effluent equalling that produced by a town of 15,000 people decided, as its first anti-pollution measure, to change the content of its paper from a base of rye straw pulp to one of recycled old papers. The recycled paper contained few pollutants. Whatever pulp was needed was purchased elsewhere, eliminating the residues of processing liquors from the waste water and leaving only suspended matter to be treated. Next, the processing and treatment systems were revised in order to maximize the volume of unpurified water available for reuse, and to clarify the remainder in a flotation-decantation apparatus, so that before discharge to the river the water could be reused in various ways. Four different tanks were required, with a total volume of 600 cu m. Process stages and equipment are described. Certain adjustments and precautions were necessary as a result of water recycling: an agitator had to be placed in the digestion tank to avoid thickening caused by flocculants in the clarified water; the paper machine had to be equipped with rinsers; the water temperature of 34-36C made it necessary to use anti-slime and anti-bacterial products; and pipe networks, subject to corrosion, had to be replaced. The effluents discharged to the river after redesigning the plant equal the pollution load from 150 people, and are well within limits set by the Ministry of the Environment. (Blits-FIRL)
W78-03189

ENVIRONMENTALLY SOUND PAPER TECHNOLOGY (UMWELTFREUNDLICHE PAPIERTECHNOLOGIE),
Technische Univ., Darmstadt (West Germany). Waser- und Abwasserforschungsstelle; and Technische Univ., Darmstadt (West Germany). Inst. fuer Paperfabrikation.
H-L. Dalpke.
Wasser, Luft, und Betrieb, Vol 21, No 6, p 370-371, 1977.

Descriptors: *Water pollution control, *Pulp and paper industry, *Water reuse, *Recycling, *Pulp wastes, Hydrolysis, Fibers(Plant), Costs, Industrial wastes, Waste water treatment.

In order to limit environmental pollution, many paper mills are adopting the closed water system of production using recycled water. Usually 50 cu m of water for each ton of paper was needed, of which 49 cu m/ton paper was then to become effluent. The West German paper industry produces annually 320 million cu m of effluent. This effluent contains fibers, starch, additives such as glues and clays, dispersants, sulfites, and sulfates. The closed system offers savings in water and energy. Its use with the alkaline hydrolysis process allows the recovery of valuable by-products such as pentoses and hexoses. (Schwartz-FIRL)
W78-03190

RAYONIER SPENDS BIG FOR SULFITE RECOVERY.
Canadian Chemical Processing, Vol 61, No 10, p 24-26, October, 1977.

Descriptors: *Sludge digestion, *Pulp wastes, *Water reuse, *Recycling, *Sulfite liquors, Pulp and paper industry, Water pollution control, Waste water treatment, Treatment facilities, Separation techniques, Evaporators, Costs.

Operations at Rayonier Canada's ammonia-base sulfite pulp mill in Port Alice, British Columbia, are described. Environmental regulations for Port Alice required recycling of red liquor at the plant or closing of the operation. A $50-million recovery system to treat up to 95% of the spent sulfite cooking liquor previously discharged into and ocean inlet near the pulp mill was subsequently built. The recovery complex includes a 30-m tall recovery boiler; evaporation and incineration equipment; and a new 16,000-kW turbogenerator. An emergency spill lagoon was installed to contain spent sulfite liquor when the recovery equipment requires maintenance. Details of the sulfur dioxide stripping system and recovery operations are presented. Cooling waters from the stripping system and recovery operations are presented. Cooling waters from the stripping process pass through heat exchangers and are used as warm wash water in the bleach plant and drying machine. The recovered bisulfite solution is pumped to a storage tank, where ammonia and water are added to bring the flow rate up to production needs for digester cooking acid. (Schulz-FIRL)
W78-03192

CONVEYOR SYSTEM TRANSPORTS SLUDGE THROUGH COMPLEX ROUTE WITH EASE.
Chemical Processing, Vol 40, No 5, p 44, April, 1977.

Descriptors: *Pulp wastes, *Conveyance structures, Equipment, *Sludge treatment, *Pulp and paper industry, Filters, Sludge disposal, Chutes, Industrial wastes, Waste water treatment.

Three conveyors are being used to transport sludge at the St. Regis Paper Company plant in Bucksport, Maine. Sludge from the waste water treatment facilities is transported to one of the two rotary vacuum filters in operation, where the volume is reduced by a ratio of 10:1. The filters include stainless steel coil spring layers which are separated over discharge rolls to allow complete media washing and positive cake discharge. The sludge, which then contains 18-22% solids, is fed to the first conveyor belt which parallels two filters to receive sludge and leads to a dewatering press. The second conveyor receives sludge at a 30-35% solids content from the dewatering press and transports it to either a storage hopper or a truck for subsequent disposal. The third conveyor is used to transport sludge from the storage hopper to trucks at its north and south ends. The conveyors, manufactured by Serpentix Conveyor Corporation of Denver, Colorado, were chosen because of their flexibility, reversibility, and other design features. The amount of floor space required was reduced by the ability of the conveyors to elevate sludge at angles up to 30 degrees. (Schulz-FIRL)
W78-03193

AN ACTIVATED CARBON WASTEWATER TREATMENT SYSTEM AT FITCHBURG, MASS.,
Camp Dresser and McKee, Inc., Boston, MA.
W. F. Callahan, and A. B. Pincince.
Tappi, Vol. 60, No. 11, p 146-149, November, 1977. 3 tab, 4 ref.

Descriptors: *Sulfides, *Activated carbon, Pulp and paper industry, *Clarification, *Pulp wastes, *Industrial wastes, Municipal wastes, Biochemical oxygen demand, Pilot plants, Filtration, Neutralization, Odor, *Waste water treatment, Treatment facilities, Massachusetts.

Fitchburg, Massachusetts, has two advanced waste water treatment plants. The West Plant treats largely paper mill waste water using a physical-chemical activated carbon process. The treatment facilities were designed for an average daily flow of 15.3 mgd at a BOD loading of 9,700 lb/day. The chlorinated municipal effluent is discharged from the municipal clarifiers and mixed with industrial waste water, lime, and alum. The combined waste waters then pass through two flocculation basins, two industrial clarifiers, and activated carbon filters. Hydrogen sulfide detected in the effluent was attributed to the development of bacteria in the filters during intermittent operation. A pilot-scale study with four carbon columns was used to evaluate methods of hydrogen sulfide control in conjunction with carbon regeneration. The pilot-plant tests indicate that addition of approximately 5 mg/liter of nitrate nitrogen and sodium hydroxide effectively controls odors associated with hydrogen sulfide. The adsorptive capacity of the carbon decreased during the tests, and sodium hydroxide treatment appeared to have little effect on prolonging column life. (Snyder-FIRL)
W78-03195

POLLUTION ABATEMENT=GOOD HOUSEKEEPING=ENERGY/MATERIAL CONSERVATION,
R. van Soest.
Canadian Pulp and Paper Industry, Vol. 30, No. 16, p 20-22, November, 1977. 2 fig.

Descriptors: *Pulp wastes, *Pulp and paper industry, *Pollution abatement, *Energy, Industrial plants, Industrial water, Water pollution, Industrial wastes, Waste water treatment, Waste water disposal, Water reuse, Water conservation.

The tremendous cost of energy has forced pulp and paper mills to take a closer look at their energy requirements for waste water treatment. Reducing the specific water consumption can produce a corresponding reduction in heat loss and the BOD and suspended solids levels in effluents. Process modifications to reduce water consumption also make it possible to reduce the size of the external treatment units, move them closer to the production facilities, and reuse the treated water. Primary clarifier performance can be adversely affected by improper sizing and design. The use of the waste activated sludge from a secondary treatment system in a sulfite mill's pulping digester has been suggested. The solution to pulp and paper mills' environmental problems must be found in an in-

tegrated program which involves all mill processes and gives due consideration to the inter-relationship between effluent treatment cost, energy and fiber conservation, and present and future legislation. (Snyder-FIRL)
W78-03196

A REVIEW OF THE STATE OF THE ART, (TREATMENT FACILITIES).
Water and Pollution Control, Vol. 115, No. 11, p 39-40, November, 1977. 1 fig.

Descriptors: *Municipal wastes, *Pulp wastes, *Pulp and paper industry, *Sewerage, *Treatment facilities, *Reviews, Water pollution control, Industrial wastes, Waste water treatment, Waste water disposal, *Canada.

Unless there are several working applications of an innovative type of waste water treatment equipment, design approval by Canadian regulatory agencies is frequently difficult to obtain. Since many municipalities could not independently fund new waste treatment plants, regulatory agencies provided financial support. It is unlikely that government agencies would prosecute if a publicly-owned plant failed to meet regulatory standards. There is a need for improved in-plant processes in industrial waste treatment. A major pulp and paper operation has been designed with potential for operating as an essentially pollution-free closed system. It has been demonstrated that polychlorinated biphenyls and waste lubricating oils containing toxicants can be safely used as supplementary fuels in cement plants. (Snyder-FIRL)
W78-03197

BIG DIGESTIVE PONDS FOR CANADIAN HARDBOARD PLANT.
Water and Waste Treatment, Vol. 20, No. 9, p 50, September, 1977. 1 fig.

Descriptors: *Pulp and paper industry, *Biological treatment, *Aeration, *Treatment facilities, *Lagoons, Sludge digestion, Pulp wastes, Industrial wastes, *Canada, Waste water treatment.

It is expected that installing 14,000 sq m of elasticized polyolefin sheeting will help the Masonite Canada Lt. hardboard plant solve an unusual effluent problem and conform to environmental regulations. A corrosion-resistant polyolefin pond and pit liner system was used for the 3.8 million liter equalization pond and the 18.9 million liter treatment pond in the extended aeration treatment plant. The equalization pond holds the effluent for one day, after which it flows into the two aeration ponds to be completely digested and clarified. The system was installed by Dunline Ltd. of Ontario in 10 days. The liner was placed over a 15-cm layer of sand which covered compacted soil. The lining was anchored by digging 45-cm ditches, securing the sheet in the ditch by logs, and backfilling the trenches. Where exposed to sunlight, the lining is expected to be resistant to ultraviolet radiation, ozone, and other atmospheric influences. The Du Pont '3110' polyolefin lining accommodates a wide range of liquids with excellent resistance to acids and solvents. (Snyder-FIRL)
W78-03198

FRP TOWER IS KEY PART OF MILL'S RECOVERY UNIT.
Water and Pollution Control, Vol. 115, No. 10, p 13, October, 1977.

Descriptors: *Pulp wastes, *Pulp and paper industry, *Treatment facilities, *Reclamation, *Sulfite liquors, Absorption, Canada, Industrial wastes, Waste water treatment.

A $50 million recovery plant for spent liquor is being added to the Rayonier Canada Ltd. sulfite mill in Port Alice, Vancouver Island, Canada. The system includes a 23-ft diameter, 73-ft high absorber-cooler tower for recovering hot water and absorbing sulfur dioxide in flue gases. The mill produces around 450 tons of dissolving pulp per day for the manufacture of film, tire cord, artificial leather, and fine paper. Unitl recently, it discharged its wastes into the waters of Neroutsos Inlet. Facilities to recover spent liquor were provided to comply with stricter provincial pollution control measures. The quench section of the absorber-cooler contains bubble cap trays in which aqueous ammonia absorbs sulfur dioxide. Heat exchangers recover heat from hot water; stack exhaust vents to the atmosphere; and filtered ammonium bisulfate is eventually pumped to the acid plant. The fiberglass-reinforced plastic shell of the absorber-cooler unit was made in sections on a vertical filament winder. The conical top, which has an inspection walkway, was molded separately. The tower contains approximately 100,000 lb of fire-retardant resin. The recovery plant was built for Rayonier Canada Ltd. by ICL Engineering Ltd. of Richmond, British Columbia, Canada. (Snyder-FIRL)
W78-03199

AIR/WATER POLLUTION MINIMIZED BY BURNING WASTES UNDER WATER,
A. P. Cadotte, and R. G. Laughlin.
Canadian Pulp and Paper Industry, Vol. 30, No. 16, p 31-33, November, 1977. 5 fig, 1 tab.

Descriptors: *Oxidation, *Incineration, *Pulp wastes, *Pulp and paper industry, *Chemical oxygen demand, Treatment facilities, Water pollution, Air pollution, Water pollution control, Industrial wastes, Waste water treatment, *Wet oxidation.

A wet oxidation process for treating spend sulfite liquors will be economically viable for small to medium sized sulfite pulping operations. It is most economical where the concentration of oxidizable material is 2-20% by weight in water. Atuo-thermal operation is achieved on wastes containing 2-3% organics, and excess energy can be economically recovered when the waste stream contains more than 6% organics. The process employs a reactor which consists of a multi-compartmented, horizontal unit with agitation and oxygen addition in each compartment. The extent of oxidation by the patented Wetox process is primarily determined by the temperature of operation. Chemical oxygen demand (COD) was reduced over 90% in 30 min using about 250 ppm of CuO as a catalyst. Neutralization and settling of the liquid phase effluent is usually required. One process configuration can be applied to all sulfite mills with only minor changes. The total net cost for a sodium base spent sulfite liquor system would e on the order of $5-6/ADT. Total net costs for calcium- or ammonia- base mills are expected to be about $3/ADT. (Snyder-FIRL)
W78-03200

5E. Ultimate Disposal Of Wastes

AQUATIC DISPOSAL FIELD INVESTIGATIONS, EATONS NECK DISPOSAL SITE, LONG ISLAND SOUND; APPENDIX A: INVESTIGATIONS OF THE HYDRAULIC REGIME AND THE PHYSICAL CHARACTERISTICS OF BOTTOM SEDIMENTATION,
Yale Univ., New Haven, CT. Dept.of Geology and Geophysics.
H. Bokuniewicz, C. Bultman, M. Dowling, J. Gerbert, and R. Gordon.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A047 421, Price codes: A00 in paper copy, A01 in microfiche. Army Engineers Waterways Experiment Station, Vicksburg, Mississippi, Technical Report D-77-6, September 1977. 195 p, 27 fig, 9 tab, 32 pl, 5 append, 35 ref.

Descriptors: *Benthic fauna, Waste disposal, *Sedimentation, Sediment transport, *Waste water disposal, *Water quality, New York, Bottom sediments, *Dredged material, *Long Island Sound(NY).

The major goal of the Eatons Neck disposal site field investigation was to evaluate the effects of aquatic disposal of dredged material on organisms and water quality, including the significance of physical, chemical, and biological factors that influence the rate of disposal site recolonization by benthic animals. A comprehensive research program was planned and conducted at Eatons Neck in order to evaluate cause and effect relationships associated with the impacts of open-water disposal. This volume of the study presents the investigation of the hydraulic regime and the physical characteristics of bottom sedimentation. The study concluded that there was no physical evidence of significant dispersion of dredged material from the Eatons Neck disposal site; no previously deposited material was detected outside the designated disposal area. (See W78-02783 thru W78-02785) (WES)
W78-02782

AQUATIC DISPOSAL FIELD INVESTIGATIONS, EATONS NECK DISPOSAL SITE, LONG ISLAND SOUND; APPENDIX D: PREDISPOSAL BASELINE CONDITIONS OF DEMERSAL FISH ASSEMBLAGES,
New York Ocean Science Lab., Montauk.
R. J. Valenti, and S. Peters.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A045 720, Price codes: A05 in paper copy, A01 in microfiche. Army Engineer Waterways Experiment Station, Vicksburg, Mississippi, Technical Report D-77-6, September 1977. 93 p, 21 fig, 7 tab, 24 ref.

Descriptors: *Benthic fauna, Waste disposal, *Fisheries, Sampling, *Waste water disposal, New York, *Long Island Sound(NY).

A comprehensive research program was planned and conducted at Eatons Neck in order to evaluate cause and effect relationships associated with the impact of open-water disposal. This volume of the study presents demersal fish sampling data at Eatons Neck. The spatial and temporal distributions of the more abundant demersal fish are discussed. The food habits of eight benthic foraging fish species are also presented. Data on lobsters, include monthly histograms denoting spatial and temporal distributions, male-female ratios, and relative abundance of exploitable legal-sized lobsters. The report concludes that the Eatons Neck site is a valuable area with regard to fishery resources. Throughout the sampling, with few exceptions, the disposal site accounted for the largest catches of fish. The disposal site was also found to be a prime lobstering area and accounted for 91.3 percent of the total number of lobsters collected. (See also W78-02782) (WES)
W78-02783

AQUATIC DISPOSAL FIELD INVESTIGATIONS, EATONS NECK DISPOSAL SITE, LONG ISLAND SOUND; APPENDIX E: PREDISPOSAL BASELINE CONDITIONS OF ZOOPLANKTON ASSEMBLAGES,
New York Ocean Science Lab., Montauk.
R. I. Caplan.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A045 310, Price codes: A06 in paper copy, A01 in microfiche. Army Engineer Waterways Experiment Station, Vicksburg, Mississippi, Technical Report D-77-6, September 1977. 104 p, 11 fig, 16 tab, 24 ref.

Descriptors: *Aquatic microorganisms, *Waste water disposal, *Fisheries, *Sampling, *Zooplankton, New York, *Dredged material, *Long Island Sound(NY).

A zooplankton and ichthyoplankton study was initiated in October 1974 for the purpose of establishing a baseline data bank at the Eatons Neck disposal site. A control site was also studied. During the 9-month study (October 1974 through June 1975), a total of 147 samples were taken at each of three stations (two disposal sites and one control) consisting of multi-depth tows utilizing 60-cm Bongo samplers (363 and 202 micron mesh nets.) Concomitantly, temperature and salinity profiling was done. The winter patterns of copepod abundance, indicated two important findings: (1) There was a copepod bloom in December 1974, 6 weeks before the spring diatom bloom. (b) Copepod densities were maximum at depth during the November diurnal, indicating a reproductive strategy not previously reported. (See also W78-02782) (WES)
W78-02784

AQUATIC DISPOSAL FIELD INVESTIGATIONS, EATONS NECK DISPOSAL SITE, LONG ISLAND SOUND; APPENDIX F: PREDISPOSAL BASELINE CONDITIONS OF PHYTOPLANKTON ASSEMBLAGES,
New York Ocean Science Lab., Montauk.
R. Nuzzi.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A045 313, Price codes: A04 in paper copy, A01 in microfiche. Army Engineer Waterways Experiment Station, Vicksburg, Mississippi, Technical Report D-77-6, September 1977. 42 p, 11 fig, 6 tab, 12 ref.

Descriptors: *Benthic fauna, *Waste disposal, Sampling, *Waste water disposal, Water quality, *Long Island Sound(NY), Path of pollutants, Water pollution effects, *Phytoplankton, *Dredged material.

The major goal of the Eatons Neck disposal site field investigaton was to evaluate the effects of aquatic disposal of dredged material on organisms and water quality, including the significance of physical, chemical, and biological factors that influence the rate of disposal site recolonization by benthic animals. A comprehensive research program was planned and conducted at Eatons neck in order to evaluate cause and effect relationships associated with the impacts of open-water disposal. This volume presents the results of an investigation to determine the baseline conditions of the phytoplankton population at the disposal site for future comparison with similar data collected after the disposal of dredged material. The ultimate objective is to determine the effects of the open-water disposal of dredged material on the phytoplankton population located within the area of the Eatons Neck disposal site. (See also W78-02782), (WES)
W78-02785

LEACHATE TESTING TECHNIQUES SURVEYED,
Mitre Corp., McLean, VA. METREK Div.
For primary bibliographic entry see Field 5A.
W78-02816

THE CONFINED DISPOSAL PROGRAM FOR POLLUTED DREDGE SPOIL IN THE GREAT LAKES,
Eastern Michigan Univ., Ypsilanti. Dept. of Geography and Geology.
For primary bibliographic entry see Field 5G.
W78-02856

MICROECONOMIC IMPACTS OF THE PROPOSED MARKING AND DISPOSAL REGULATIONS FOR PCBS.
Environmental Protection Agency, Washington, DC. Office of Toxic Substances.
For primary bibliographic entry see Field 5G.
W78-03043

COMBUSTION EXPERIMENTS USING PENTACHLOROPHENOL ON A PILOT SCALE AND FULL-SCALE,
Swedish Water and Air Pollution Research Lab., Stockholm.
B. Ahling, and L. Johansson.
Chemosphere, No. 7, p. 425-436, 1977. 2 tab, 11 ref.

Descriptors: *Phenols, *Saw mills, *Burning, *Water pollution control, Sludge disposal, Waste disposal, Industrial wastes, Incineration, Pentachlorophenol, Saw timber, Chlorinated phenols.

Use of chlorinated phenols for impregnation saw timer at saw mills through immersion results in waste products which constitute a water pollution hazard. Experiments investigating the destruction of used dipping fluids and sludge in existing combustion facilities (for burning bark and saw dust), show that if the temperature is kept above 750-800C reliable destruction can be accomplished. Excessively high loading resulted in unacceptable emissions of chlorinated phenols, which probably occurred in great part when the temperature fell below about 700C. Preparations containing pentachlorophenol or other chlorinated phenols are commonly used in the impregnation process; plants which reuse the fluid must first remove the sludge, while othe mills simply empty immersion tanks usng sludge suction systems. Dumping of used fluids and sludge has been the only treatment method heretofore available. Pilot scale tests with 50-70 g pentachlorophenol fed in per hour indicate that at a transit time of 3.5 sec the unburnt residue of pentachlorophenol was 52 mg/kg feed at 600C, 23 mg/kg at 700C, and 16 mg/kg at 800C. Combustion was carried out with a large surplus of air. No formation of octachlorodioxin occurred. In full-scale tests, analysis showed that waste fed in contained much teteachlorophenol than pentachlorophenol; nevertheless test results are considered applicable to disposal of the latter as well. (Lynch-Wisconsin)
W78-03058

SWINE FECES RECYCLING IN CARP FEEDING (CYPRINUS CARPIO, LINNAEUS), (IN PORTUGESE),
G. C. Albuquerque-F, E. J. Campos, S. S. Cavalcanti, and I. B. M. Sampaio.
Arq Esc Vet Univ Fed Minas Gerais 28(2), p 147-152, 1976.

Descriptors: *Hogs, *Recycling, *Carp, Fish food, Taste, Economics, *Farm wastes.

The use of pig feces to feed carps was studied. Feed ration consisting of 25, 50 and 75% feces was observed for 245 days. Carp weight gain was significantly greater than control groups. Economic value of this method and acceptable palatability of feces-fed carp to a human taste panel are discussed.-Copyright 1978, Biological Abstracts, Inc.
W78-03082

ON RECYCLING AS A MOOT ENVIRONMENTAL ISSUE,
Princeton Univ., NJ. Dept. of Economics.
For primary bibliographic entry see Field 5G.
W78-03086

A BIBLIOGRAPHY ON OCEAN WASTE DISPOSAL, SECOND EDITION,
Interstate Electronics Corp., Anaheim, CA. Environmental Engineering Div.
H. G. Stanley, and D. W. Kaplanek.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-265 831, Price codes: A08 in paper copy, A01 in microfiche. Final Report to Environmental Protection Agency, September 1976. 153 p, (600 ref). EPA-68-01-0796.

Descriptors: *Waste disposal, *Bibliographies, *Water pollution sources, Oil pollution, *Outer Continental Shelf, *Ocean dumping, Pollution monitoring, Coastal zone management.

In May of 1973 the need for a specialized bibliography in ocean waste disposal was recognized and the first edition of this publication was issued. New material has become available resulting in the preparation of an updated and expanded second edition. This volume contains listings of more than 600 documents with 82 of them abstracted. It is primarily limited to recent publications in the categories of: general ocean waste disposal, nonpoint source oceanic disposal of radioactive wastes, and at-sea incineration. A list of identifiers for computerized accession is included. (Sinha-OEIS)
W78-03087

A COMPUTER ANALYSIS OF THE SPREAD OF POLLUTION ON LONG ISLAND BEACHES,
Brookhaven National Lab., Upton, NY. Dept. of Applied Science.
For primary bibliographic entry see Field 5B.
W78-03103

MOVEMENT OF SPILLED OIL OVER THE BEAUFORT SEA SHELF - A FORECAST,
Coast Guard Research and Development Center, Groton, CT.
For primary bibliographic entry see Field 5B.
W78-03108

TEMPORARY STORAGE AND ULTIMATE DISPOSAL OF OIL RECOVERED FROM SPILLS IN ALASKA,
Battelle Pacific Northwest Labs., Richland, WA.
P. L. Peterson, R. A. Yano, and M. M. Orgill.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A032 749, Price codes: A12 in paper copy, A01 in microfiche. Coast Guard Office of Research and Development Report No. CG-D-181-75, December 1975. 239 p, numerous charts, fig, ref. DOT-CG-23223-A.

Descriptors: *Alaska, *Oil pollution, *Ultimate disposal, Waste storage, Oil wastes, Water quality control, Pollution abatement, *Outer Continental Shelf, Prudhoe Bay(Alas).

Alternative methods for temporary storage and ultimate disposal of oil recovered from postulated spills in Alaska are identified. Seven representative sites felt to be future areas of high spill potential are evaluated with respect to storage and disposal of spills ranging in volume from 100 to 50,000 barrels. The types of spills considered are crude oil, distillate fuel oil, residual fuel oil and gasoline. The potential adverse effects of the Alaskan environment on handling, storage and ultimate disposal of oil spills are compared to more temperate climates is also discussed. Two distinct requirements for storage were identified: immediate (from hours to days) and temporary storage (up to one year). It was concluded that all temporary storage should be on land. Portable storage containers and the use of natural terrain features are evaluated from the range of spill sizes and types. Alternatives evaluated for the ultimate disposal of oil include both in-situ turning and burning in conventional burners and incinerators. In-situ burning emerged as the preferred method of disposal at virtually all sites evaluated. (Sinha-OEIS)
W78-03110

HYDROLOGIC MONITORING OF A WASTE-INJECTION WELL NEAR MILTON, FLORIDA, JUNE 1975 - DECEMBER 1976,
Geological Survey, Tallahassee, FL. Water Resources Div.
For primary bibliographic entry see Field 5B.
W78-03126

INCINERATORS FOR WASTES FROM THE CHEMICAL INDUSTRY (INCINERATEURS DE DECHETS DE L'INDUSTRIE CHIMIQUE),
R. Dorre, and C. De Bouille.
La Technique Moderne, No. 1, p 39-42, January, 1977. 5 fig.

Descriptors: *Chemical wastes, *Incineration, *Heat exchangers, *Centrifugation, *Industrial wastes, Waste water treatment, Sludge treatment, Pesticides, Waste disposal, Ultimate disposal.

In general, wastes from the chemical industry fall within four categories: liquid wastes, arising from production, laboratories, and service stations; sludges, arising from purification of waste waters and having a solids content of 15-50%; solid wastes; and polluted gases. For liquid, sludge, and gaseous wastes special kinds of incinerators can be used, such as combustion chambers and fluidized bed incinerators. Rotating kilns, described in detail, are especially useful for solids wastes. When these are combined with other wastes, special adaptations are necessary. By integrating a fluidized bed burner with a rotating kiln, sludges containing 18% solid matter after centrifugation can be disposed. The resulting ashes and smoke from the two furnaces can be burned in a common post-combustion chamber. As a complement, a heat recovery system can be combined with this installation. An application of the installation for incinerating wastes from pesticides manufacturing is described. (BLITS-FIRL)
W78-03159

WASTE WATER, SLUDGES, AND SOLID WASTES OF CHEMICAL INDUSTRY--TREATMENT, INCINERATION, DUMPING (ABWASSER, SCHLAEMME SOWIE FESTE RUECKSTANDE DER CHEMISCHEN INDUSTRIE--AUBEREITEN, VERBRENNEN, DEPONIEREN),
Bayer A. G., Krefeld-Uerdingen (West Germany). Abt. Umweltschutz.
G. Franke.
Fette-Seifen-Anstrichmittel, Vol. 79, No. 5, p 212-214, 1977. 5 fig.

Descriptors: *Chemical wastes, *Biological treatment, *Incineration, *Recycling, *Organic compounds, Industrial wastes, Sludge disposal, Landfills, Waste water treatment.

As an example of waste treatment the procedures of the Uerdingen Works of Bayer AG were described. The waste water from that plant was found to consist of 80% cooling water, 10% waste water from inorganic chemical production, and 10% waste water from organic chemical production. The organics waste water was treated first during the plant operations with extraction of the organic material for recycling purposes, then subjected to biological degradation and residue incineration. The total sludge from the treatment plant for the cooling water and organics waste was dried and then incinerated in a fluid-bed furnace. The inorganic residues consisting of building rubble, cinders, and slag from incinerators, as well as wastes from the production of inorganic pigments, were considered non-combustible special wastes. These were neutralized, reduced, and precipitated before being dumped in landfills. Dangerous residues were sealed in drums and stored in an abandoned salt mine. (Schwartz-FIRL)
W78-03160

EPA DEVELOPS PROCESS TO DESTROY KEPONE,
M. L. Motl.
Environmental Management, Vol 1, No 6, p 491-493, 1977. 2 fig, 3 ref.

Descriptors: *Pesticide removal, *Chlorinated hydrocarbon pesticides, *Insecticides, *Chemical wastes, Sewage treatment, Sewerage, Waste treatment, Industrial wastes, Waste water treatment, Waste water disposal, *Kepone.

After production of Kepone was stopped, tens of thousands of pounds of the pesticide already produced had to be destroyed, as did sewage sludge and wash water containing Kepone. Because no known microbial or biological agent can degrade Kepone and the compound has great thermal stability, it is very difficult to remove. The Solid and Hazardous Waste Research Division of the Environmental Protection Agency cooperated with the Department of Health of the Commonwealth of Virginia in investigations on Kepone degradation. The final cost of the research effort will come to approximately $400,000 with extensive precautions and isolation procedures to protect personnel during experimentation accounting for a large proportion of the cost. The pesticide is first vaporized at 200-300C and then passed through a special high temperature quartz tube at approximately 1000C for one sec. All the Kepone is degraded into innocuous products. Wash water accumulated when Life Science Products Inc. Kepone plant in Hopewell, Virginia, was leveled. Currently, 1.5 million gallons of contaminated sewage sludge await treatment in a lagoon. (Snyder-FIRL)
W78-03165

SEWAGE SLUDGE COMBUSTION.
Water and Waste Treatment, Vol 20, No 9, p 38, September, 1977.

Descriptors: *Incineration, *Recycling, *Fuels, *Energy, Equipment, Food processing wastes, Drying, *Dewatering, Industrial wastes, Waste water treatment.

Wellman Incandescent in England has recently designed, installed, and commissioned a series of Copeland fluidized bed recovery systems for the combustion of sewage sludge with recovery of inorganic chemicals and heat values. A Wellman system has been installed for the disposal of radioactive wastes at the CEGB nuclear power station in Somerset, England. Wellman's Swenson range of evaporation, crystallization, and drying equipment has been used at the Long John's Strathclyde Distillery for the conversion of spent wash to a usable cattle feed and in the chemical, fertilizer, and food and paper processing industries. Effluent recovery systems have been developed for use with plating wastes and radioactive wastes. Inert gas and nitrogen generators, multi-fuel burners, carbon dioxide removal systems, and compression and drying equipment are also produced by Wellman. (Schulz-FIRL)
W78-03168

RECOVERY AND REUSE OF WASTES FROM ORGANIC CHEMICAL INDUSTRIES,
For primary bibliographic entry see Field 5D.
W78-03171

RECOVERY OF USEFUL BY-PRODUCTS FROM DISTILLERY WASTES,
Indian Engineers Ltd., New Delhi.
R. N. Chakrabarthy.
Indian Chemical Journal, Annual Number, p 101-106, 1977. 1 fig, 6 tab, 10 ref.

Descriptors: *Food processing industry, *Fuels, *Recycling, *Costs, *Methane, Industrial wastes, Water reuse, Fertilizers, Nutrient removal, Waste water treatment.

The recovery of nutrients and methane from molasses distillery wastes has been considered, since fertilizers and fuels are in great demand in India. Previous studies on the recovery of methane, potash, and vitamin B12 from distillery wastes are described. A 90-gal/hr pilot plant is operated at the Mohan Meaken Breweries Ltd. plant in Lucknow. Treatment of the spent wash includes neutralization, filtration, and evaporation. The thick evaporated liquor is then transferred to an incinerator and the potassium salts are recovered from the resulting ash. Economics of the treatment and recovery process are described. Operations of a 1,000-gpd pilot plant for the biological treatment of distillery waste at the Hindustan Sugar Mills Ltd. plant in Galagokarannath are described. The plant includes a closed digester, heat exchanger, gas collection and burning equipment, activated sludge process, aeration tank, and sludge treatment equipment. A savings of approximately 60% in fuel costs is predicted from the use of spent wash-generated fuel in distillery operations. (Schulz-FIRL)
W78-03173

TREATING WASTEWATER FOR RECYCLING,
Ecodyne Corp., Union, NJ. Industrial Wastewater Div.
For primary bibliographic entry see Field 5D.
W78-03176

THE COLLECTION, NEUTRALIZATION, AND DISPOSAL OF RINSE WATER,
Armco Steel Corp., Kansas City, MO.
For primary bibliographic entry see Field 5D.
W78-03178

SLUDGE RECLAMATION.
Electroplating and Metal Finishing, Vol. 29, No. 11, p 3-4, November, 1976.

Descriptors: *Industrial wastes, *Waste water treatment, *Treatment facilities, Europe, *Sludge treatment, Sludge, Reclamation, Metals, Effluents, Economics.

In Britain, sludge dumping is expensive although not unusually hard to organize, but in other parts of Europe obtaining permission for dumping industrial wastes has been more difficult. Many European electroplaters have been puzzled as to how to dispose of heavy metal-rich sludges. Commercial metal recovery companies will normally reprocess dewatered sludges containing fairly high proportions of nickel and copper, as long as they are relatively uncontaminated with difficult impurities. A good deal of thought has been invested in developing recovery techniques for less valuable materials. The main goal is to develop practicable as well as economic separation techniques. One planned sludge treatment plant will chlorinate heavy metal sludges at a pH above 4 to oxidize iron and trivalent chromium. Then, the sludge will be acidified to pH 1.5-2.5 using sulfuric acid, bringing the chromium, copper, nickel, and zinc into solution, but leaving behind the iron, silicates, calcium, and about 20% of the aluminum. Chromium is removed from the solution by ion exchange. Copper, zinc, and aluminum are concentrated by solvent extraction. Aluminum is precipitated with caustic soda, and nickel is recovered by acid stripping and electro-deposition. (Snyder-FIRL)
W78-03180

WATER TREATMENT AND RECYCLING IN A PAPER MILL (RECYCLAGE ET TRAITEMENT DES EAUX DANS UNE PAPETERIE),
For primary bibliographic entry see Field 5D.
W78-03189

AIR/WATER POLLUTION MINIMIZED BY BURNING WASTES UNDER WATER,
For primary bibliographic entry see Field 5D.
W78-03200

5F. Water Treatment and Quality Alteration

NATIONAL SURVEY OF PESTICIDES IN DRINKING WATER,
Stanford Research Inst., Menlo Park, CA.
For primary bibliographic entry see Field 5A.
W78-02750

IMPLEMENTING THE DRINKING WATER ACT--A NEW APPROACH FOR EPA,
For primary bibliographic entry see Field 5G.
W78-02869

WATER TREATMENT SYSTEM,
A. P. Black.
U.S. Patent No. 4,017,391, 23 p, 5 fig, 5 tab, 7 ref; Official Gazette of the United States Patent Office, Vol 957, No 2, p 710, April 12, 1977.

Descriptors: *Patents, *Water treatment, *Water quality control, *Water purification, Water softening, Separation techniques, Magnesium, Calcium, Turbidity, Product recovery.

This invention relates to the treatment of raw water supplies such as those used by municipalities and industries as a source of fresh water and has to do with the removal of turbidity factors and coloring matter from such supplies and also with the recovery of waste water and chemical values that are commonly discarded as waste products of the treatments. Chemical and aqueous components of sludge derived from lime treatments of raw water supplies are recovered by procedures involving carbonation of the sludges to effect a phase separation between magnesium and calcium components. When the magnesium content of the rawwater is intolerable in the treated water, a magnesium carbonate is recovered from the liquid phase by its decarbonation, and the aqueous component of the liquid phase is recycled to recover the water values of the treated sludge. When the magnesium content of the raw water can be tolerated in the treated water, the liquid phase magnesium bicarbonate solution is recycled to the water treatment plant. Turbidity factors separated with the sludges remain with the insoluble calcium carbonate that is separated from the liquid phase and by avoiding conventional coagulants other than magnesium hydroxide in the treatment of the raw water, turbidity and calcium carbonate components can be separated as by conventional froth flotation procedures to recover a quality lime product. (Sinha-OEIS)
W78-02895

PURIFICATION OF SALINE WATER,
For primary bibliographic entry see Field 3A.
W78-02910

EFFECTS OF INTERMITTENT CHLORINATION ON AQUATIC ORGANISMS AND COMMUNITIES,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Biology; and Virginia Polytechnic Inst. and State Univ., Blacksburg. Center for Environmental Studies.
For primary bibliographic entry see Field 5C.
W78-02993

TECHNIQUES FOR CONCENTRATING VIRUSES FROM WATER TREATED FOR PUBLIC DISTRIBUTION, (IN FRENCH),
Ecole Polytechnique, Montreal (Quebec).
A. J. Drapeau, H. Hoang Van, and P. P. Dumoulin.
Annee Biol 15(11/12), p 486-518, 1976.

Descriptors: *Viruses, Absorption, Potable water, *Water treatment, Public health, Alginate, Electrolytes, Filtration, Iron oxide, *Membranes(Micropore), *Polyelectrolyte.

Of the methods described in the literature for concentrating minute amounts of viruses from large volumes of drinking water, 4 are considered most promising: Absorption on micropore membrane, on an alginate membrane, on polyelectrolytes such as PE60 between prefilters and on iron oxide between prefilters. Prefilters are necessary to keep sediment out of the virus concentrate but they cause a considerable loss of absorbed viruses. Adsorption and elution techniques determine the yields by these methods to a large extent. The type of virus and the nature of the viral suspension influence the efficacy of adsorption. Except for alginate membranes, the volume of eluant required is too large to permit direct viral titration, and it must be reconcentrated. These problems render the yield of these absorption techniques highly variable, and often make the choice of technique highly debatable.--Copyright 1978, Biological Abstracts, Inc.
W78-03038

THE FRENCH MARKET FOR AIR AND WATER PURIFICATION AND POLLUTION CONTROL EQUIPMENT.
Domestic and International Business Administration, Washington, DC.
For primary bibliographic entry see Field 5G.
W78-03042

LEAD IN DRINKING WATER IN SOFT WATER AREAS -- HEALTH HAZARDS,
Glasgow Univ., Glasgow (Scotland). Dept. of Materia Medica.
For primary bibliographic entry see Field 5B.
W78-03143

5G. Water Quality Control

CHEMICAL CONTROL OF ZOOTHAMNIUM SP. ON LARVAL MACROBRACHIUM ACANTHURUS,
Texas Parks and Wildlife Dept., Ingram. Heart of Hills Fisheries Research Station.
M. A. Roegge, W. P. Rutledge, and W. C. Guest.
Aquaculture, Vol 12, 1977, p 137-140. 1 tab, 3 ref.

Descriptors: *Aquiculture, *Fish diseases, Commercial shellfish, *Crawfish, *Metals, Copper sulfate, Protozoa, Fish hatcheries, Fish handling, Establishments, Potassium compounds, Parasitism, Bioassay, *Chemcontrol, *Macrobrachium, *Ciliate protozoa, *Zoothamnium, *Disease treatments, Dylox, Methylene blue, Terramycin, Combiotic, Potassium permanganate, Roccal, Nitrofurazone, Malachite green, Disease control.

Ten chemicals were tested for their ability to control an outbreak of Zoothamnium sp. on larval Macrobrachium acanthurus. Larvae were exposed for 24 h to various concentrations of each chemical. Copper sulfate, Dylox(R), methylene blue, Terramycin(R), Combiotic(R), potassium permanganate, Roccal(R), nitrofurazone, and malachite green showed little control of Zoothamnium sp. or were toxic to larvae. Formalin at 50 ppm gave complete control of Zoothamnium sp. and had no ill effects on the larvae. (Katz)
W78-02711

BIBLIOGRAPHY OF STRIP MINE ECOLOGY,
Iowa State Univ., Ames. Energy and Mineral Resources Research Inst.
D. C. Glenn-Lewin, G. Fay, and S. D. Cecil.
Energy and Mineral Resources Research Institute, Report No. 15-ICP-20, May 1976. 47 p, 564 ref.

Descriptors: *Mineral industry, Mining, Mining engineering, *Mine wastes, Mine waters, *Strip mines, *Strip mine wastes, Terrestial habitats, Plant population, Planting management, Water quality, Freshwater fish, Aquatic plants, Reclamation, Agronomy, Forestry, Wildlife, Wildlife habitats, Bibliographies.

A bibliography was prepared to serve those interested in the ecology, environment, and reclamation of surface mine spoil banks, especially those of local strip mines. The major categories treated are bacteria, terrestial environment, physical environment and soils, plants, natural revegetation, physiological effects, animals, water quality, and hydrology, flora, and fauna, fish, reclamation, agronomy, forage and livestock, forestry, fish and wildlife, and recreation. (Katz)
W78-02744

PROCEEDINGS, RESEARCH PLANNING CONFERENCE ON THE AQUATIC PLANT CONTROL PROGRAM, 19-22 OCTOBER 1976.
Army Engineer Waterways Experiment Station, Vicksburg, MS.
For primary bibliographic entry see Field 4A.
W78-02757

A MANAGEMENT PROCEDURE FOR THE INTRODUCTION OF BIOLOGICAL AGENTS FOR CONTROL OF AQUATIC PLANTS,
Army Engineer Waterways Experiment Station, Vicksburg, MS.
For primary bibliographic entry see Field 4A.
W78-02758

A CONCEPT FOR THE DEVELOPMENT OF LONG-TERM MANAGEMENT PLANS FOR AQUATIC PLANT CONTROL,
Army Engineer Waterways Experiment Station, Vicksburg, MS.
For primary bibliographic entry see Field 4A.
W78-02759

A FIELD TEST OF SELECTED INSECTS AND PATHOGENS FOR CONTROL OF WATER-HYACINTHS; REPORT 1, PRELIMINARY RESULTS FOR THE 1975-76 SEASON,
Army Engineer Waterways Experiment Station, Vicksburg, MS.
For primary bibliographic entry see Field 4A.
W78-02766

REAERATION TESTS, OUTLET WORKS, BELTZVILLE, DAM, POHOPOCO CREEK, PENNSYLVANIA,
Army Engineer Waterways Experiment Station, Vicksburg, MS.
E. D. Hart, and S. C. Wilhelms.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A043 291, Price codes: A03 in paper copy, A01 in microfiche. Technical Report H-77-14, July 1977. 38 p, 9 fig, 2 tab, 10 pl, 9 ref, append.

Descriptors: *Outlet works, Prototype tests, *Reaeration, Pennsylvania, Water quality control, *Beltzville Dam(Pa), *Pohopoco Creek(Pa).

Prototype water-quality tests were conducted at Beltzville Dam during August 1976. Twelve tests were conducted. Temperatur and dissolved oxygen data (vertical profiles) were collected upstream of the dam, at seven stations within the outlet structure, and at one station in the downstream channel. The tests involved various flow rates and various outflow port elevations. The results of these prototype tests showed: (1) the dissolved oxygen content of the release flows was approximately 90 to 95 percent of the saturation level regardless of the dissolved oxygen content of the flow entering the structure or the discharge, and major reaeration occurred within the outlet structure downstream of the water-quality gate; (2) the predictions of the SELECT model were in close agreement with the observed data; and (3) the hydraulic measurements were close to those of the 1973 tests. (WES)
W78-02771

LITERATURE SURVEY AND PRELIMINARY EVALUATION OF STREAMBANK PROTECTION METHODS,
Army Engineer Waterways Experiment Station, Vicksburg, MS.
For primary bibliographic entry see Field 2J.
W78-02776

FREEZE-THAW ENHANCEMENT OF THE DRAINAGE AND CONSOLIDATION OF FINE-GRAINED DREDGED MATERIAL IN CONFINED DISPOSAL AREAS,
Cold Regions Research and Engineering, Hanover, NH.
For primary bibliographic entry see Field 4A.
W78-02777

RECENT TANKER ACCIDENTS: LEGISLATION FOR IMPROVED TANKER SAFETY (PART 2; HEARINGS ON S. 182, S. 568, S. 682, S. 715, AND S. 898).
For primary bibliographic entry see Field 6E.
W78-02825

POLLUTION OF LAKE MICHIGAN AND ITS TRIBUTARY BASIN, ILLINOIS, INDIANA, MICHIGAN, AND WISCONSIN.
Environmental Protection Agency, Chicago, IL. Region V.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-257 336, Price codes: A10 in paper copy, A01 in microfiche.
Proceedings of the Public Session on Pollution of Lake Michigan and its Tributary Basin, Illinois, Indiana, Michigan, and Wisconsin, November 9, 1972, Chicago, Illinois. 141 p.

Descriptors: *Lake Michigan, *Federal Water Pollution Control Act, *Permits, *Thermal pollution, *Water quality standards, Michigan, Illinois, Indiana, Wisconsin, Fish, Wildlife, Discharge(Water), Monitoring, Economic feasibility, Environmental effects, Law enforcement, Nuclear powerplants, Cooperation, Phosphorus, Chlorides, Pesticides, Trace elements, Polychlorinated biphenyls, Cooling towers.

A public session of the Lake Michigan states and the Environmental Protection Agency (EPA) was held in 1972 in an attempt to bridge the gap between enforcement conference processes required before passage of the Federal Water Pollution Control Act Amendments of 1972 and the requirements of the new legislation. At the public session, participants discussed thermal and non-thermal pollution of Lake Michigan. Proposed water quality standards requiring installation of auxiliary cooling facilities at six nuclear powerplants under construction were explained, as were recommendations concerning status of compliance, and treatment of phosphorus, chlorides, pesticides, trace metals, phthalates, polychlorinated biphenyls and taste and odor problems in Lake Michigan. A panel of environmental experts from the Environmental Protection Agency, Michigan, Illinois, Indiana, and Wisconsin explained the newly instituted permit process for the benefit of the dischargers, powerplants and state and local regulators present at the hearing. The new act requires issuance of a permit before any discharge into the lake is permitted, and requires that the EPA Administrator conduct comprehensive studies on the effects and methods of controlling thermal discharges. (Spector-Florida)
W78-02828

MARINE RESOURCES COMMITTEE - ANNUAL REVIEW OF SIGNIFICANT ACTIVITIES - 1976,
W. M. Meyers, C. C. Smith, Jr., J. T. Bockrath, R. J. Greenwald, and J. E. Phillips, Jr.
Natural Resources Lawyer, Vol. 10, No. 1, p 115-28, 1977.

Descriptors: *Oil spills, *Exploration, *Environmental effects, *Oil industry, *Legislation, Judicial decisions, Water quality, Water pollution, Exploitation, Coasts, Environmental control, Federal government, Compensation, Financing, Fish, Fisheries, Law of the Sea, Legal aspects, Mining, Water pollution sources, Oil pollution, Water pollution.

Recent legislative and judicial activity has taken place with regard to the United States offshore seabed resources, deepwater ports, coastal zone management, fisheries, deep seabed hard minerals, preservation of the marine environment and the proposed Law of the Sea Convention. Although much of the activity has encouraged offshore gas and oil exploration and ocean mining, the preservation of the environment has also been a major concern. Projects designed for oil and gas exploration, development and production have not been authorized without first considering the economic, environmental, and coastal state impacts. In addition, the legislation has been broad with express provisions for liability and penalties for oil spills. The judiciary has imposed liability upon oil tankers for any oil spills they might cause. The federal government has even established a national assistance program to states and local governments with approved offshore oil exploration programs to meet their environmental needs resulting from specific activities involving energy development. The trend in federal legislation and judicial decisions reflects the growing need for energy sources balanced by stricter regulation and imposed liability in order to preserve the environment. (Kastner-Florida)
W78-02833

SEWERS, CLEAN WATER, AND PLANNED GROWTH: RESTRUCTURING THE FEDERAL POLLUTION ABATEMENT EFFORT.
Yale Law Journal, Vol. 86, No. 4, p 733-81, March 1977.

Descriptors: *Sewers, Grants, *Financing, *Regional development, Government finance, Cost repayment, Projects, Allotments, Cities, Comprehensive planning, Regional analysis, Urban hydrology, Sewage districts, Governments, Planning, Waste treatment, Land use, Urbanization, Zoning, Drainage systems, Community development, Growth rates.

Title II of the Federal Water Pollution Control Act of 1972 promises communities financial assistance for the construction of waste treatment facilities. There has been, however, a reluctance on the part of local communities to embrace the sewer construction grants. This note examines the flaws in the Federal Water Pollution Control Act (FWPCA) which invite this reluctance and outlines the author's suggestion for a program that would harmonize the potentially conflicting goals of clean water and planned growth. The author criticizes the FWPCA and the proposals for its amendment because of their functional approach. He recommends that Title II be replaced with a comprehensive program that would permit sewers to be designed in a manner consistent with local development objectives. This might be achieved by funding regional comprehensive planning agencies that have established pollution abatement programs which are compatible with the requirements of the FWPCA and governed by a regional growth plan. Instead of awarding construction grants to individual projects, the Environmental Protection Agency would make annual grants to qualifying programs. (Curran-Florida)
W78-02835

UNITED TO PROTECT THE MEDITERRANEAN,
United Nations Environment Program, Geneva (Switzerland).
P. S. Thacher.
Oceans, Vol. 10, No. 1, p 58-61, January 1977.

Descriptors: *Foreign projects, *Pollution abatement, *United Nations, *Water pollution control, *Water quality, Aquatic environment, Aquatic habitats, Aquatic life, Aquatic populations, Bodies of water, Chlorinated hydrocarbon pesticides, Ecosystems, Europe, Foreign waters, Metals, Monitoring, Oil wastes, Pollutants, Projects, Water pollution, Water pollution effects, Water quality control.

Representatives of sixteen states bordering the Mediterranean Sea convened the Intergovernmental Meeting on the Protection of the Mediterranean Sea in January, 1975, under the auspices of the United Nations Environmental Program. This article briefly reviews the major components of the Barcelona Plan approved at that meeting. An overall 'Framework Convention' treaty was proposed, under which signatory nations agree to cooperate in adopting environmental legislation, pollution monitoring, research and development, and enforcement of sanctions against violators of the Convention. Additional protocols were developed which pledged subscribers to abate dumping of pollutants. The delegates also approved a program consisting of the following pilot projects: (1) monitoring of oil and petroleum hydrocarbons in the Mediterranean; (2) monitoring of metals in marine organisms; (3) monitoring of DDT, PCBs, and other chlorinated hydrocarbons in marine organisms; (4) research on the effects of pollutants on marine organisms; (5) research on the effects of pollutants on marine communities and ecosystems; (6) problems of coastal dispersion of pollutants; and (7) coastal water quality control. The plan also called for intergovernmental cooperation in the prediction and management of future growth in the Mediterranean area. (White-Florida)
W78-02836

AN HONORABLE DISCHARGE FOR THE BIGGEST POLLUTANT,
Fish and Wildlife Service, Washington, DC.
J. Crowder.
Parks and Recreation, Vol 12, No 2, p 28a-30a, February 1977.

Descriptors: *Federal Water Pollution Control Act, *Dredging, *Permits, *Wetlands, *Water pollution sources, Channel improvement, Landfills, Ecology, Administrative agencies, Ecosystems, Pollutants, Legislation, Water pollution control, Legal aspects, Regulation, Land development, Wildlife conservation, Shellfish, Water quality, Aquatic environment, Waste disposal, Environmental effects.

The Federal Water Pollution Control Act is a complex, comprehensive piece of legislation. It is justifiably complex because of the enormity of the problem it is designed to correct. The water pollution problem of today is a result of decades of unawareness and unconcern. One specialized pollution problem the act addresses is how to deal with dredge and fill materials generated in the production of navigation systems and other water resource development activities. Dredge and fill materials can become pollutants when relocated in a way that damages the normal functioning of ecosystems or when they become a medium for transfer of contaminants absorbed or mixed with them. The amount of fill produced each year is enormous and Congress acknowledged the need for regulating dredge and fill activities by requiring permits. Through the permit process, proposals are studied with a view to anticipating environmental impact and finding ways to protect fish, shellfish, wildlife and their habitats, recreation and water quality. Therefore, unnecessarily destructive discharges will usually be prohibited. For instance, filling wetlands for projects such as residential developments that do not really require waterfront sites is now discouraged. (Beamer-Florida)
W78-02839

WATER MANAGEMENT--THE FUTURE OF FLORIDA LEGAL IMPLICATIONS,
Florida Univ., Gainesville. Inst. of Food and Agricultural Sciences.
For primary bibliographic entry see Field 6E.
W78-02840

TENSIONS AND CONFLICTS IN FEDERAL POLLUTION CONTROL AND WATER RESOURCE POLICY,
Environmental Defense Fund, New York. Eastern Water Resources and Land Use Program.
J. T. Tripp.
Harvard Journal on Legislation, Vol 24, No 2, p 225-80, April 1977.

Descriptors: *Water pollution, *Pollution abatement, *Administrative agencies, *Legislation, *Federal project policy, Water pollution sources, Wastes, Water pollution control, Water quality, Project planning, Project feasibility, Construction costs, Economic life, Financing, Recreation, Research and development, Fish reproduction.

The Environmental Protection Agency (EPA) administers the Federal Water Pollution Control Act Amendments of 1972. The main objective is 'to restore and maintain the chemical, physical, and biological integrity of the nation's waters'. Two goals are predominant: elimination of pollutant discharges into navigable waters; and water quality which provides for biological propagation and safe recreation. Deadlines have been established which tend to force implementation of short-range, incomplete programs. Long-range planning is required to insure program success. The EPA has two basic tools: the power to enforce established water quality standards; and the authority to finance grants for construction projects and research development efforts. Tight time schedules have created inconsistent goals within the EPA. Construction is hurried so that deadlines can be met. However, modern techniques becoming available require more time for perfection. The result is construction that lags behind the state of the art. Congress is partially to blame, expecting too much, too soon. The EPA has also aggravated the problem through delays in setting standards, poor planning, and underbudgeting of its' research and development efforts. (Thomas-Florida)
W78-02841

THE LIABILITY OF A SALVOR RESPONSIBLE FOR OIL POLLUTION DAMAGE,
B. A. Dubais.
Journal of Maritime Law and Commerce, Vol 8, No 3, p 375-86, April 1977.

Descriptors: *Oil spills, *Oil pollution, *Pollution abatement, *Water pollution control, *Water pollution sources, International law, International waters, Insurance, Common law, Oil industry, Oceans, Legal aspects, International commissions, Accidents, Disasters, Civil law, Law of the Sea, Regulation, Water treatment, Foreign waters, Federal government, Hazards.

In helping to control the damaging effects due to oil spills, salvors subject themselves to the risk of aggravating such pollution and must be afforded some protection. Oil companies have organized plans to fight accidental pollution, to guarantee adequate compensation to victims of pollution, and to devise techniques to reduce the risk of pollution; but these organizations do not protect salvors. Salvors may now rely on customary insurance market resources but some people believe that they would be better protected by an international legal regime like the one promulgated by the 1969 Convention of Civil Liability for oil Pollution Damage. However, this is doubtful since the salvor would then have to give up the common law criterion of fault liability. It is suggested that because of their common interest in the matter, it would be possible for shipowners and salvors to cooperate and use their respective expertise for developing some sort of code of salvage operations for oil tankers. While this has been attempted on an international level, the initiative will not be beneficial for years to come. Professional organizations could do the job better and faster. (Hammersley-Florida)
W78-02844

FEDERAL COMMON LAW REMEDIES FOR THE ABATEMENT OF WATER POLLUTION,
For primary bibliographic entry see Field 6E.
W78-02847

SECTION 10 OF THE RIVERS AND HARBORS ACT: JURISDICTION SHOREWARD OF THE MEAN HIGH TIDE LINE,
D. A. Haagensen.
University of Miami Law Review, Vol. 31, No. 3, p. 697-712, Spring 1977.

Descriptors: *Rivers and Harbors Act, *Navigable waters, *Permits, *Federal jurisdiction, *Dredging, Legislation, Jurisdiction, Water law, Federal government, Boundaries(Property), Land tenure, Drainage, Marshes, Canals, Legal aspects, Water pollution, Regulation, High water mark, Judicial decisions, Water pollution control.

Under Section 10 of the 1899 Rivers and Harbors Act, the Army Corps of Engineers requires permits for dredge and fill activities affecting navigable waters. The Fifth Circuit Court of Appeals recently upheld the Corps' assertion of permit jurisdiction above the mean high tide line (MHTL). The court said that such jurisdiction is proper if the dredge and fill operations alter the course or affect the navigable capacity of navigable waters. The decision is in direct opposition to numerous earlier cases but is justifiable since the MTHL is not a statutory jurisdictional limit and was only adopted because of its use in other areas. It has also become increasingly obvious that activities beyond the MHTL can have a definite affect on navigable waters. In another Fifth Circuit decision, the court held that an alteration and modification of the condition and capacity of a navigable water body could occur through ecological damage. Although dredge and fill jurisdiction under the Federal Water Pollution Control Act Amendments of 1972 is extremely broad, the efforts of Congress to restrict this jurisdiction make the Fifth Circuit decision important as a backup source of extended jurisdiction. (Capehart-Florida)
W78-02852

FEDERAL COMMON LAW AND INTRA-STATE POLLUTION,
For primary bibliographic entry see Field 6E.
W78-02854

THE CONFINED DISPOSAL PROGRAM FOR POLLUTED DREDGE SPOIL IN THE GREAT LAKES,
Eastern Michigan Univ., Ypsilanti. Dept. of Geography and Geology.
E. Jaworski, and C. N. Raphael.
Coastal Zone Management Journal, Vol. 3, No. 1, p. 91-96, 1976.

Descriptors: *Great Lakes, *Waste water(Pollution), *Pollution abatement, *Water pollution treatment, Waste water treatment, Water treatment, Waste dilution, Sediments, Bottom sediments, Industrial wastes, Sewage, Municipal wastes, Waste disposal, Water quality, Local governments, Bottom sampling, Water pollution, Dredging, Harbors, Great Lakes region, Hypolimnion, Lake Michigan, Structures.

The 1970 Rivers and Harbors Flood Control Act authorized the Army Corps of Engineers to build containment facilities for polluted dredged spoil in the Great Lakes. The dredged material was to be held for a maximum of ten years while polluton elimination system were implemented. This method would avoid open-lake disposal of polluted material and improve the water quality of the Great Lakes. Delay in the construction of containment sites has resulted in certain modifications in the confined disposal program. The delay was caused by the reluctance of local communities to provide the necessary land and easements. Due to the Environmental Protection Agency's revision of the pollution criteria, less containment space is now required. However, cleanup of the area may not be accomplished within the authorized ten-year period unless technological improvements are made and pollution abatement plans are implemented. Polluton abatement can be accomplished through more effective treatment of municipal sewage and industrial wastes. (Quarles-Florida)
W78-02856

ENVIRONMENTAL PROTECTION AGENCY'S VIEW OF PROJECTED OIL DRILLING ON THE CONTINENTAL SHELF,
Environmental Protection Agency, Washington, DC. International Affairs.
For primary bibliographic entry see Field 6E.
W78-02862

DEPARTMENT DISCUSSES INTERNATIONAL APPROACHES TO PROBLEM OF OIL SPILLS FROM VESSELS,
Law of the Sea Conference, New York.
For primary bibliographic entry see Field 6E.
W78-02864

HOW PEOPLE WHO REMEMBER CLEAN WATER ARE USING NEW LAWS TO BRING IT BACK,
National Wildlife, Vol 15, p 26-27, December 1976.
For primary bibliographic entry see Field 6E.
W78-02865

IMPLEMENTING THE DRINKING WATER ACT--A NEW APPROACH FOR EPA,
A. J. Magida.
National Journal, Vol. 8, No. 24, p. 822-24, June 12, 1976.

Descriptors: *Potable water, *Water purification, *Water quality standards, *Regulation, Industrial wastes, Water quality, Water pollution sources, Legislation, State governments, Organic wastes, Water pollution, Environmental sanitation, Chemical wastes, Water policy, Consumptive use, Water pollution sources, Pesticide toxicity, Water law, Federal jurisdiction, Diseases, Water works.

Since the enactment of the 1974 Safe Drinking Water Act, environmentalists have condemned the Environmental Protection Agency (EPA) for failure to establish adequate standards for water pollutants. EPA and Environmental Defense Fund studies have revealed many dangerous pollutants, including carcinogens, in the drinking water of many cities. The EPA has used these findings to delay promulgation of organic chemical standards, in order to gain confidence and support in communities without raising too much alarm. Instead the National Drinking Water Advisory Board, composed of government, utility, industry and academic representatives drafted standards and regulations under the Act. Due to manpower and funding shortages, the EPA has had to rely too much of the Board and lax state agencies. In addition, there were too many water systems to control for the EPA to pursue strict standards. A federal suit by the Environmental Defense Fund was filed against the EPA. Among the charges were failure to monitor contaminants, to regulate carcinogens and to set maximum contaminant levels for toxic substances. Despite environmentalists' concerns, state officials have praised the EPA for its realistic administration and reliance on expert advice from the Advisory Board. (Cocheu-Florida)
W78-02869

TOWARD REGIONAL ARRANGEMENTS FOR REGULATION OF MARINE POLLUTION: AN APPRAISAL OF OPTIONS,
Nairobi Univ. (Kenya). Inst. for Development Studies.
C. O. Okidi.

Ocean Development and International Law Journal, Vol. 4, No 1, p. 1-25, 1977.

Descriptors: *Oil pollution, *International law, *Law of the Sea, *Oceans, *Water pollution control, Administrative agencies, Regional analysis, Water law, Indian Ocean, Oil spills, Water pollution, International waters, Treaties, Foreign waters, International commissions, Regulation, Governments, Standards, Foreign countries, Wastes, Coasts.

Marine pollution affects two interest categories: the international community's interest in preserving the living resources for nutrition and other purposes; and, the coastal-states' interest in protecting their coastal waters and shoreline. This article analyzes and appraises three institutional options by which states may control and regulate pollution of the seas to protect these interests. These options are: (1) a continuation of the present decentralized system by which states may take unilateral regulatory measures of the type adopted by Canada in 1970; (2) a global regulatory system centered around a global superagency; and (3) a network of regional regulatory arrangements. The author rejects the unilateral approach to the regulation of pollution in the high seas because it is likely to lead to serious conflicts between nations. The author feels that a global regulatory scheme is necessary because the complex task of regulating a global problem requires a global agency. However, factors such as regional types of polluton, regional mechanisms for dealing with ecological catastrophes, and a need for maximum participation by states in a regulatory system may make a system of regional organizations more desirable. (Curran-Florida)
W78-02870

WETLANDS LEGISLATION IN NEW HAMPSHIRE,
For primary bibliographic entry see Field 6E.
W78-02872

THE FEDERAL WATER POLLUTION CONTROL ACT AND FORESTRY,
National Forest Products Association, Washington, DC. Environmental Quality Dept.
B. C. Grefrath.
Journal of Forestry, Vol 72, No 12, p 757-59, December 1974.

Descriptors: *Forest management, *Federal Water Pollution Control Act, *Water pollution sources, *Water resources development, Erosion control, Forest soils, Forestry, Sediment control, Forests, Natural resources, Legislation, Legal aspects, Governments, State government, Federal government, Local governments, Pollutants, Soil contamination, Wildlife management.

Enforcement of pollution control at the source, both point sources (industrial plants) and nonpoint sources (forestry and agricultural lands), is emphasized by the Federal Water Pollution Control Act (F W P C A). The Act does not give the Environmental Protecton Agency (EPA) direct authority over pollution control from nonpoint sources, but such sources are required to meet basic water quality standards, developed by the states. The federal role in nonpoint source control programs involves: (1) national planning and coordination of state programs; (2) development and dissemination of information; and (3) funding for state and local programs. The educational role of the EPA is extensive, including composing a model state forest practice act, focusing on soil erosion and sediment control. The FWPCA leaves enforcement of water quality control and planning to the states with strong influence anticipated from the EPA. State reports must be approved by the EPA before federal funding is approved. Local governments are required to develop waste treatment management programs for sources in areas with water quality problems. Several states require forestry professionals to administer their control programs through a state forestry agency. (Mulligan-Florida)
W78-02873

SOME RESULTS OF COMPARING THE ECOLOGICAL SCALES OF RAMENSKII, ELLENBERG, HUNDT AND KLAPP, (IN RUSSIAN),
Leningrad State Univ. (USSR). Biological Inst.
For primary bibliographic entry see Field 6G.
W78-02874

SAVING THE GREAT LAKES,
Maclaren (James F.) Ltd., Willowdale (Ontario).
J. W. MacLaren.
Journal of Soil and Water Conservation, Vol 32, No 3, p 116-17, May 1977.

Descriptors: *Comprehensive planning, *Great Lakes, *Great Lakes region, *International Joint Commission, Average flow, Environmental control, Canada, United States, Impaired water use, Industries, Municipal water, Natural resources, Oil spills, Water quality control, Recreation, Regional analysis, St. Lawrence River, Thermal pollution, Water resources.

The Great Lakes constitute a vast natural resource difficult to protect and control. On an average day, enough water comes from the Great Lakes watershed to supply each person in the United States and Canada with over five hundred gallons (Imperial) of water. The Great Lakes are presently threatened by domestic and industrial pollution, heat pollution from power plants, agricultural drainage, shoreline erosion, oil spills, and polluted dredge spoils. A comprehensive plan for development of the Great Lakes' water and related land resources is essential. Such a plan should be supervised by the International Joint Commission, which has jurisdiction over all cases of use, obstruction of diversion of Great Lake's waters. It should include the following: acceleration of the Great Lakes Basin Commission's program of planning and implementation to become the major vehicle of resource management in the United States portion of the Great Lakes; formation of Canadian counterpart to the Great Lakes Basin Commission; and, development of a comprehensive resource management plan by the two commissions to be financed through levy of a withdrawal charge on all Great Lakes users. (Spector-Florida)
W78-02875

OUTBOARD MOTOR FOR REDUCING EXHAUST GAS POLLUTANTS,
Aktiebolaget Volvo Penta, Goteborg (Sweden). (Assignee).
H. Pichl.
U.S. Patent No. 4,015,429, 4 p, 1 fig, 8 ref; Official Gazette of the United States Patent Office, Vol 957, No 1, p 54, April 5, 1977.

Descriptors: *Patents, *Water pollution control, *Water quality control, Oil pollution, Equipment, Outboard motors.

In an outboard motor having an engine located above the water level, a lower unit is provided extending downward from the engine. It includes an exhaust gas tube within the lower unit with its lower end positioned below the water level. Enclosing the exhaust gas tube is a liquid jacket and a heat insulating jacket for maintaining the temperature of the exhaust gases at a level such that an afterburning of any oil residue in the exhaust gases is achieved before the gases are discharged from the exhaust gas tube. (Sinha-OEIS)
W78-02887

FLOATABLE OIL FENCE,
Suzuei Co. Ltd. (Japan). (Assignee).
I. Ahiko.
U.S. Patent No. 4,015,431, 6 p, 3 fig, 9 ref; Official Gazette of the United States Patent Office, Vol 957, No 1, p 54, April 5, 1977.

Descriptors: *Patents, *Oil pollution, *Oil spills, Water pollution control, Water quality control, Floating, Containment, Booms.

A bloatable boom which is capable of effectively opposing movement of a body of water, as the result of waves or the like, over the boom, as well as effectively opposing movement of a surface of the body of water beneath the boom is described. The bloatable boom includes an elongated tubular means for containing air under pressure so as to assume a floating condition. An upper fin is fixed to and extends longitudinally along the tubular means. This upper fin projects upward from the tubular means so as to oppose the movement of water over the tubular means. A lower fin is fixed to and extends longitudinally along the tubular means. The lower fin projects downward beyond the tubular means to oppose movement of water with any mateial floating on it, beneath the tubular means. The interior of the tubular means is divided into chambers which are prevented from connecting with each other by partitions. As a result, in the event that the tubular means ruptures at one of the chambers, the tubular means nevertheless will remain afloat. (Sinha-OEIS)
W78-02888

BILGE WATER DISPOSAL SYSTEM INCLUDING OIL RECOVERY MEANS,
National Marine Service, Inc., St. Louis, MO. (Assignee).
C. H. Walters, H. J. Barmeier, Jr., and G. E. Sullivan.
U.S. Patent No. 4,018,683, 15 p, 4 fig, 13 ref; Official Gazette of the United States Patent Office, Vol 957, No 3, p 1146, April 19, 1977.

Descriptors: *Patents, *Oil pollution, *Oily water, *Water pollution control, Separation techniques, Equipment, Control systems, Evaporation, Bilge water, Oil recovery.

An environmentally protective bilge water disposal system utilizes an inverted dome gravitational oil separator unit in combination with an engine exhaust flash water vaporizor to remove and recover oil contamination from the bilge water prior to its disposal by flash evaporation in the exhaust stack. Bilge water is drawn by suction into a hermetically sealed floating dome oil separator where the oil accumulates under the top of the floating dome. Depending upon the oil content of the incoming bilge mixture and the specific gravity of the oil, the dome rises quickly or slowly as more or less oil is collected during any span of time. The suction of bilge water is maintained by pumping processed water from the outlet side of the separator, this water being relatively free of oil contamination. However, since the processed water may still contain small amounts of oil or other dissolved contaminants, overboard discharge of the water is not always desirable and therefore this invention contemplates disposal of the water by flash evaporation of the water in the hot exhaust stream of an internal combustion engine aboard the vessel. An elaborate control arrangement is included within the system. (Sinha-OEIS)
W78-02902

TANK VESSEL TRAFFIC REGULATION ACT.
For primary bibliographic entry see Field 6E.
W78-02912

ABANDONED MINE DRAINAGE CONTROL ACT.
For primary bibliographic entry see Field 6E.
W78-02913

SURFACE MINING.
For primary bibliographic entry see Field 6E.

W78-02914

ALASKA OIL DISCHARGE PREVENTION AND POLLUTION CONTROL ACT (GENERAL AND MISCELLANEOUS PROVISIONS).
For primary bibliographic entry see Field 6E.
W78-02915

OIL TERMINAL FACILITIES: TRANSFER OF CRUDE OIL, REFINED PETROLEUM PRODUCTS OR THEIR BY-PRODUCTS.
For primary bibliographic entry see Field 6E.
W78-02916

LIMITATION ON OIL AND GAS LEASES IN CERTAIN AREAS, AND REACQUISITION OF LEASES.
For primary bibliographic entry see Field 6E.
W78-02918

COASTAL PROTECTION FUND.
For primary bibliographic entry see Field 6E.
W78-02919

CIVIL ACTION FOR POLLUTION; DAMAGES; INJUNCTIONS; CRIMINAL PENALTIES.
For primary bibliographic entry see Field 6E.
W78-02920

COX V. CAMBRIDGE SQUARE TOWNE HOUSES, INC.
For primary bibliographic entry see Field 6E.
W78-02922

PPG INDUSTRIES, INCORPORATED V. ENVIRONMENTAL PROTECTION AGENCY.
For primary bibliographic entry see Field 6E.
W78-02923

MOORE V. HAMPTON ROADS SANITATION DISTRICT (OYSTER BED DAMAGE FROM SEWAGE DISCHARGE NOT WITHIN FEDERAL ADMIRALTY JURISDICTION).
For primary bibliographic entry see Field 6E.
W78-02927

AMERICAN ASSOCIATION OF MEAT PROCESSORS V. COSTLE (STATUE OF LIMITATIONS FOR REVIEW OF EFFLUENT GUIDELINES).
For primary bibliographic entry see Field 6E.
W78-02930

MARINO PROPERTY COMPANY V. PORT OF SEATTLE (ENVIRONMENTAL IMPACT STATEMENT NOT REQUIRED FOR CHANGE IN OWNERSHIP).
For primary bibliographic entry see Field 6E.
W78-02936

WILLIAMS AND EBERLEY, INCORPORATED V. MACLEOD (ADEQUACY OF WATERS AND SEWAGE FACILITIES IN PROPOSED SUBDIVISION).
For primary bibliographic entry see Field 6E.
W78-02939

APPROPRIATION AND REGULATION OF GROUND WATER.
For primary bibliographic entry see Field 6E.
W78-02941

GRAY V. HUDSON (TITLE TO LAND CREATED BY FILL OPERATION).
For primary bibliographic entry see Field 6E.
W78-02956

IN RE LEGISLATIVE ROUTE (THE NECESSITY FOR STATE ENVIRONMENTAL IMPACT STATEMENT FOR BRIDGE REPAIRS).
For primary bibliographic entry see Field 6E.
W78-02957

COMMONWEALTH V. BARNES AND TUCKER COMPANY (POWER OF THE STATE TO COMPEL A MINE OWNER TO PREVENT THE DISCHARGE OF UNTREATED ACID MINE WATER).
For primary bibliographic entry see Field 6E.
W78-02959

FEDERAL COMMON LAW OF NUISANCE AS A BASIS FOR RELIEF IN ENVIRONMENTAL POLLUTION CASES.
For primary bibliographic entry see Field 6E.
W78-02961

LOVELADIES PROPERTY OWNERS ASSOCIATION, INCORPORATED V. RAAB, (PROCEDURAL REQUIREMENTS FOR CITIZEN SUITS UNDER THE FEDERAL WATER POLLUTION CONTROL ACT).
For primary bibliographic entry see Field 6E.
W78-02963

PARSELL V. SHELL OIL COMPANY (NO JURY TRIAL IN OIL SPILL DAMAGES SUIT UNDER FEDERAL ADMIRALTY JURISDICTION).
For primary bibliographic entry see Field 6E.
W78-02964

SAVE OUR SOUND FISHERIES ASSOCIATION V. CALLAWAY (AWARD OF ATTORNEY'S FEES IN ENVIRONMENTAL CITIZEN SUITS).
For primary bibliographic entry see Field 6E.
W78-02965

UNITED STATES V. KETCHIKAN PULP COMPANY (STANDARDS OF REVIEW FOR CHALLENGES TO FWPCA DISCHARGE PERMITS).
For primary bibliographic entry see Field 6E.
W78-02966

STATE WATER CONTROL BOARD V. HOFFMAN (LAKE DETERMINED NAVIGABLE AND SUBJECT TO FEDERAL PERMIT JURISDICTION).
For primary bibliographic entry see Field 6E.
W78-02967

ENVIRONMENTAL DEFENSE FUND, INCORPORATED V. MORTON (FEDERAL AUTHORITY IN APPROVING WATER OPTION CONTRACTS FOR INDUSTRIAL USE).
For primary bibliographic entry see Field 6E.
W78-02968

OHIO V. GASTOWN, INCORPORATED (STRICT LIABILITY FOR OIL SPILLS UNDER OHIO WATER POLLUTION LAW).
For primary bibliographic entry see Field 6E.
W78-02970

QUARLES PETROLEUM COMPANY, INCORPORATED V. UNITED STATES (SUBROGATION UNDER THE FEDERAL WATER POLLUTION CONTROL ACT).
For primary bibliographic entry see Field 6E.
W78-02971

NEVADA WATER POLLUTION CONTROL LAW.
For primary bibliographic entry see Field 6E.
W78-02975

DELANO V. COLLINS (REASONABLE ALTERATION OF NATURAL RUNOFF PATTERNS BY LANDFILL FOR IMPROVEMENT OF RESIDENTIAL PROPERTY).
For primary bibliographic entry see Field 6E.
W78-02977

REFUSE IN PUBLIC PLACES AND STREAMS.
For primary bibliographic entry see Field 6E.
W78-02984

THE RECOVERY OF DAMAGED STREAMS,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Biology; Virginia Polytechnic Inst. and State Univ., Blacksburg. Center for Environmental Studies.
J. Cairns, Jr., J. S. Crossman, K. L. Dickson, and E. E. Herricks.
ASB Bulletin, Vol. 18, No. 3, p 79-106, July, 1971, 20 fig, 8 tab, 26 ref.

Descriptors: *Streams, *Water pollution, *Industrial wastes, *Water pollution effects, Pollutants, Water quality, Virginia, Pennsylvania, Tennessee, Acidity, Acid mine water, Creosote, Fish, Benthic fauna, Toxicity, *Stream recovery, Spills(Industrial), Mill Creek(VA), Roanoke River(VA), Indian Creek(PA), Little Scrubgrass Creek(PA), Ethyl benzene, Clinch River(VA TN).

Four cases are described in which streams in the northeastern U.S. recovered from various stresses: (1) simulated shock acidification of Mill Creek, near Blacksburg, VA; (2) long-term acid mine drainage from Appalachian coal fields into Indian Creek in southern Pennsylvania and Little Scrubgrass Creek in northwestern Pennsylvania; (3) an ethyl benzene-creosote spill on October 10, 1970 in the Roanoke River at Salem, VA; and (4) two industrial spills on the Clinch River in southwestern Virginia and northeastern Tennessee. The ability of a stream to assimilate wastes depends on its capacity to transform them before they reach deleterious levels. Recovery from overload depends on (1) the severity and duration of the stress; (2) associated stresses; (3) recolonization by beneficial organisms; and (4) residual effects upon nonbiological units, such as the substrate. Short-term acute stress from release of acidic or caustic materials results in immediate reduction in the macroinvertebrate and fish communities. A rapid recovery may be expected when no residual toxicity is found and recolonizing organisms are available from undamaged areas. Long-term acute stress, and stresses from materials with residual toxicities, also produce an immediate reduction in both diversity and density of organisms, but with residual toxicities the surviving macroinvertebrates tend to form an interim atypical community which persists for the duration of the toxicity.
W78-02990

FEEDLOT MANURE TOP DRESSING FOR IRRIGATED PASTURE: GOOD AGRICULTURAL PRACTICE OF A HEALTH HAZARD,
Department of Agriculture, Lethbridge (Alberta). Research Station.
R. G. Bell, D. B. Wilson, and E. J. Dew.
Bulletin of Environmental Contamination and Toxicology, Vol. 16, No. 5, November 1976, p. 536-540. 4 tab, 12 ref.

Descriptors: *Pathogenic bacteria, *Coliforms, *Feed lots, *Irrigated land, *Farm wastes, *Animal diseases, Orchardgrass, Water pollution effects, Epidemiology, *Salmonella dublin, *Dactylis glomerata L., *Spray irrigation.

A study of the survival of Salmonella dublin (a major cause of acute salmonellosis in cattle) after feedlot manure is applied focused on three information points: (1) the yields of grass after application of manure at various rates; (2) the extent to which pasture top-dressed with feedlot manure

becomes contaminated during irrigation; and (3) how long the contamination persists. The study used fecal coliform bacteria which may themselves be pathogenic, but are accepted as indicators for the potential presence of Salmonella. An application of 25-t/ha of manure did not increase yield of orchard grass relative to the untreated plots. The yield of plots receiving top dressing at 118 kg inorganic N/HA, was double that of the untreated plots. Levels of fecal coliform contamination just after each irrigation varied greatly. Highly variable contamination occurring after the first irrigation was not caused by splashing from manure, since untreated plots were as contaminated as those that were top-dressed. This occurred because the irrigation water had been fecally contaminated by liquid waste from a packing house lagoon on neighboring property that had overflowed into the irrigation supply ditch. Fecal coliforms were essentially eliminated from the pasture after exposure to between 50 and 65 hours of bright sunlight. Little contamination of the pasture occurred after the second irrigation, when water contained only 80 fecal colifroms/100 ml. (Spaeth-Wisconsin)
W78-03000

EFFECTS OF DESTRATIFICATION AND AERATION OF A LAKE ON THE DISTRIBUTION OF PLANKTONIC CRUSTACEA, YELLOW PERCH, AND TROUT,
Wisconsin Dept. of Natural Resources, Madison.
For primary bibliographic entry see Field 5C.
W78-03006

DEVICE FOR EVALUATING COALESCENCE OF OIL EMULSIONS,
Engineering-Science, Inc., Houston, TX.
For primary bibliographic entry see Field 5D.
W78-03032

DECONTAMINATING LAKE SUPERIOR OF ASBESTOS FIBERS,
Army Mobility Research and Development Command, Fort Belvoir, VA. Sanitary Sciences Div.
For primary bibliographic entry see Field 5D.
W78-03040

GREAT LAKES WATER QUALITY, FIFTH ANNUAL REPORT TO THE INTERNATIONAL JOINT COMMISSION.
International Joint Commission-United States and Canada. Great Lakes Water Quality Board.
1976 Annual Report, July, 1977. 81 p, 9 fig, 14 tab.

Descriptors: *International Joint Commission, *Great Lakes, *Water quality, *Water pollution control, Water pollution, Lake Michigan, Lake Erie, Lake Superior, Lake Huron, Lake Ontario, Pollution abatement, Toxins, United States, Canada, International commissions, Effluents.

This fifth annual report of the International Great Lakes Water Quality Board to the International Joint Commission concludes that there have been no major changes in open lake water quality since the fourth report a year ago. A detailed account is given of all major activities under the Canada-U.S. Great Lakes Water Quality Agreement, including: (1) governmental progress toward meeting the recommendations of the fourth report; (2) water quality objectives, standards, and regulatory requirements; (3) current water quality assessment; (4) status of pollution abatement programs; (5) review of obligations under the agreement; and (6) emerging pollution problems. It is recommended that: (1) governments increase emphasis on enforcing requirements for municipal and industrial dischargers; (2) new water quality objectives for chlorine, silver, and dodecachloropentacyclodecane (mirex) be adopted as proposed; (3) mirex be banned in the Great Lakes; (4) toxic substances control proposals in this report be adopted; (5) hazards to human health from persistent chemicals be evaluated; and (6) governments improve their response to Joint Commission recommendations prusuant to these annual reports. Of 63 water quality problem areas listed in the 1975 report, 17 have been deleted, and one (Waukegan Harbor) has been added. The reduction in problem areas more accurately reflects available data, but does not indicate major improvements in water quality. (Lynch-Wisconsin)
W78-03041

THE FRENCH MARKET FOR AIR AND WATER PURIFICATION AND POLLUTION CONTROL EQUIPMENT.
Domestic and International Business Administration, Washington, DC.
Available from the National Technical Information Service, Springfield, VA 22161 as DIB-77-08-504, Price codes: A00 in paper copy, A01 in microfiche. Report No. DIB-77-08-504, May, 1977. 74 p, 17 tab, 5 append.

Descriptors: Equipment, *Air pollution, *Water pollution control, *Marketing, Pollution abatement, Economic feasibility, Export, Planning, *France, International trade.

The total market in France for air and water pollution control equipment in 1976 was valued at $327 million; for 1980 the projection is $417 million. Air pollution equipment in 1976 accounted for 25.8% of the total market, water pollution equipment 68.3%, and monitoring instrumentation 5.9%. A study determined the potential market in France for U.S. suppliers of such equipment, and identified major customers and distributors and specific products with the greatest sales potential for 1977-80. Products with the best potential for 1980 include industrial wastewater systems, absolute filters, scrubbers, and air and water monitoring equipment; the most important end user industries are expected to be chemicals, electrical power, petroleum, aluminum, and iron and steel. Imports in 1976 represented 6.5% of the market, but are expected to fall to 6.4% by 1980. Imports largely consisted of air and water monitoring equipment, and wastewater and gaseous air pollution control equipment. Pollution control equipment imported from the U.S. was valued at $4.31 million in 1974, $5.69 million in 1976, and is forecast at $7.49 million for 1980. In 1976 the greatest user demand for air pollution equipment was from iron and steel (20%), nonferrous metals (18%), and chemial processing, (16%); greatest users of water pollution equipment were local authorities (60%), iron and steel (9%), and pulp and paper (8%). (Lynch-Wisconsin)
W78-03042

MICROECONOMIC IMPACTS OF THE PROPOSED MARKING AND DISPOSAL REGULATIONS FOR PCBS.
Environmental Protection Agency, Washington, DC. Office of Toxic Substances.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-267 833, Price codes: A09 in paper copy, A01 in microfiche. Report No. EPA-560/6-77-013, April 1977. 5 fig, 33 tab, 14 ref, 5 append. EPA 560/6-77-013, 68-01-3259.

Descriptors: *Polychlorinated biphenyls, *Pollutants, *Electrical equipment, *Economic impact, Economics, Costs, Toxins, Landfills, Incineration, Pollution abatement, Capacitors, *Toxic Substances Control Act, Transformers.

There is currently five times as much polychlorinated biphenyls (PCBs) in use in electrical equipment as there is free in the environment. Use of PCBs in manufacturing transformers and capacitors will be phased out by 1977 or 1978 under provisions of the Toxic Substances Control Act of 1976; marking and disposal regulations will therefore have little effect on manufactureres of new equipment, and will primarily affect owners and users of existing PCB transformers and capacitors. This study evaluates the economic impact of proposed EPA regulations pursuant to Section 6(e) (1) of the Control Act; they establish requirements for storage, record-keeping, labelling, and disposal of PCB equipment. the basic disposal requirement for all PCBs is controlled use and storage, followed by high temperature incineration. Due to high incineration costs, several exemptions have been permitted, including small capacitors in electrical equipment, PCB containers, and material with less than 500 ppm PCBs. One of three alternatives for disposal is recommended, in which all small capacitors are diverted to chemical waste landfills; this option requires only one new incinerator at a cost of $39 million annually, compared with $69 million for option 2 and $134 million for option 1. (Lynch-Wisconsin)
W78-03043

METHODOLOGY AND MEASUREMENTS OF BENEFITS OF POLLUTION ABATEMENT IN A COMMUNITY,
Pittsburg Univ., PA. Graduate School of Business.
R. F. Byrne, M. H. Spiro, C. Marshall, and W. Capitman.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-259 452, Price codes: A05 in paper copy, A01 in microfiche. Environmental Protection Agency Report, June 1976. 92 p, 10 lab, 47 ref, 4 append. 68-01-1876.

Descriptors: *Air pollution, *Pollution abatement, *Social aspects, *Benefits, Pennsylvania, Social impact, Cost-benefit analysis, Model studies, Analytical techniques, Methodology, *Clairton(PA), Willingness to pay.

A methodology developed for assessing community benefits from pollution abatement, based on willingness of residents to pay, was tested on a sample of 99 residents of Clairton, Pennsylvania. Social science survey techniques were combined with economic model building in the analysis. Clairton, with a population of 15,051 in 1970, is a highly industrialized town twenty miles from Pittsburgh dominated by giant steel, chemical, and coke works. Air pollution is very severe, although racial tensions are considered more important by residents. A preliminary series of interviews was followed by a 235-item questionnaire designed to explore the existence of differential social and psychological states and paterns of behavior, and to measure the relationship between pollution (and Pollution abatement) and satisfaction with the quality of life (well-being). Integral to the analysis was an index of subjective well-being. In general it was found that residents of Clairton are very concerned with air quality, and are willing to pay for a cleaner environment. An upward bias is suspected in the results, however, due to the substitution of subjective pollution assessment for objective measurement, necessitated by research budget constraints. It is recommended that the study should be replicated in ten communities across the country with differing pollution levels. (Lynch-Wisconsin)
W78-03044

NOTES ON THE SYMMETRY OF TAXES AND SUBSIDIES IN POLLUTION CONTROL,
Harvard Inst. of Economic Research, Cambridge, MA.
A. M. Polinsky.
Discussion Paper No. 515, October 1976. 16 p, 13 fig, 24 ref.

Descriptors: *Taxes, *Pollution abatement, *Pollution taxes(Charges), Economics, Model studies, Decision making, *Subsidies.

The proposition that efficient pollution control can be achieved by a balance of subsidies and pollution taxes has been critically examined in several studies with a consensus that the symmetry argument is valid only in the short-run. This paper

shows that not only are subsidies more inefficient in the long-run than has been realized, but may also be inefficient even in the short-run. It has been pointed out that in the long-run a subsidy induces an excessive number if firms to enter the industry, leading to excessive total output and pollution. What is not mentioned is that any given level of total output, even the wrong one, can be produced at different costs. A subsidy which conditions a fixed benefit on entry may also cause each firm to produce at an inefficient production level in the long-run. The subsidy may also be inefficient in the short-run since, even though no new firms can enter, existing firms can exit as a result of the corrective policy (i.e., produce zero output and earn negative profits equal to fixed costs). To achieve symmetry in the short-run, subsidies must be given to short-run 'potential entrants,' for which there may be political reluctance. Therefore, the tax might cause some firms to go out of business, while the subsidy could inefficiently induce these firms to stay in. The proposal to compensate firms existing when a tax is instituted with a lump sum may create serious disparity between efficiency and equity. (Lynch-Wisconsin)
W78-03048

IMPACT OF USER CHARGES APPLIED TO INLAND WATERWAYS.
Ernst and Ernst, Washington, DC.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-268 459, Price codes: A07 in paper copy, A01 in microfiche. Maritime Administration, Washington, D.C., Office of Policy and Plans, December 1976. 23 fig, 16 ref, 2 append. MA-GEN-370-77084.

Descriptors: *Use rates, *Island waterways, *Barges, *Economic impact, Economics, Taxes, Inflation(Economic), Income distribution, Transportation, Ohio River, Water users, Water resources, Commodity flows.

Economic effects of imposing inland waterway user charges are assessed in terms of inflation, financial impact, tax incidence and income redistribution, and competing mode impact. A user charge is levied against persons or firms using inland waterways for transportation of commerce, and can be a license fee, fuel tax, ton-mile tax, or segment toll. Six raw materials (coal, crude petroleum, farm products, lumber and wood products, nonmetallic minerals (sand, gravel, cement), and iron ore), and three processed products (industrial chemicals, iron and steel products, and petroleum products) account for 90% of total barge traffic. Flow charts for these commodities were prepared and analyzed, and the impact of a user charge on the following sectors was evaluated: the barge, market, electricity market, consumer durable market, and rail markets, and the transportation sector. A case study of a user charge on coal transport on the Ohio River demonstrated effects on residential electricity prices, and on the output of three industries: industrial chemicals, primary metals, and fabricated metals. A significant result of the study was indentification of information needed to assess the impact of user charges. It was concluded that aggregation of impacts across transportation firms, intermediate goods producers and users, and consumers results in a misleading impact assessment. (Lynch-Wisconsin)
W78-03050

COST OF CLEANING THE ENVIRONMENT.
Environmental Protection Agency, San Francisco, CA. Region IX.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-257 632, Price codes: A04 in paper copy, A01 in microfiche. Panel Discussion, Environmental Protection Agency, Los Angeles, California, March 30, 1972. 70 p.

Descriptors: *Pollution abatement, *Economic impact, *Costs, Economics, Economic feasibility, Cost-benefit analysis, Water pollution control, Air pollution, Model studies, *Environmental Protection Agency.

This paper is a transcript of a panel discussion by administrators of the Environmental Protection Agency (EPA) held on March 30, 1972 in Los Angeles, California. Participants included William D. Ruckelshaus, Administrator, Paul De Falco, Jr., Thomas E. Carroll, Robert Sansom, Ellison Burton, Mark Pisano, and John Hill. Ruckelshaus asserted that the benefits of pollution control should at least equal costs. Air pollution costs for fiscal 1973-77 were estimated by the EPA at $42 billion, while the Council on Environmental Quality estimated total cost to industry and government of air and water clean-up and better solid waste management for 1970-75 at $105 billion (0.1% of the cumulative gross national product). Current pollution control requirements could force the closing of 200-300 industrial plants in 11 major industrial groups by 1976, but would not seriously hurt the industries. In these 11 industries 50,000-125,000 jobs could be eliminated (1.0-4.0%). Existing and anticipated pollution controls would reduce national GNP about 0.6% from 1972-1980, and overall unemployment would rise 0.1% (80,000-100,000 jobs). Other points discussed included the ability of the economy to absorb control costs, effects on consumer price index and on consumption, air and water pollution, automobile emission standards, and a macroeconomic model for cost inputs. (Lynch-Wisc).
W78-03051

FINANCIAL CRITICAL FACTORS ANALYSIS.
Miami Valley Regional Planning Commission, Dayton, OH.; and Linton and Co., Inc., Washington, DC.
For primary bibliographic entry see Field 5D.
W78-03052

ECONOMIC ANALYSIS OF EFFLUENT GUIDELINES FOR THE SOAP AND DETERGENT INDUSTRY. PHASE I,
Environmental Protection Agency, Washington, DC. Office of Planning and Evaluation.
C. A. Houston, F. C. Herot, N. S. Douglas, and A. W. Fleer.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-256 313, Price codes: A07 in paper copy, A01 in microfiche. Report No. EPA-230/2-73-026, August, 1973. 122 p, 39 tab, 19 ref. 68-01-1566.

Descriptors: *Soaps, *Detergents, *Effluents, *Water pollution control, *Industrial wastes, Industrial water, Waste water treatment, Waste water disposal, Model studies, Economic impact, Prices, Federal Water Pollution Control Act Amendments(1972).

Proposed federal effluent guidelines for the soap and detergent industry would have a serious impact on smaller companies, leading to price increases, but would not greatly affect larger firms. No adverse community, employment, or balance of payment effects are foreseen, and no plant closings are anticipated. A small soap company, small liquid detergent company, and very large intergrated soap and detergent company were modelled to test economic effects of guidelines. Process changes required of small companies would require price increases, whereas the larger companies could more readily absorb such costs. However, since the industry is characterized by a highly concentrated market, market leaders probably will not wish to risk public censure or government punitive action due to an increase in their already large share of the market, and may be forced to raise their prices as well to avoid squeezing out the smaller producers. In 1970 four companies (Procter and Gamble, Lever Brothers, Colgate-Palmolive, and Purex) accounted for 70% of total shipment value, four more accounted for another 9%, and 350 firms made up the rest. Over 985 of plants now send effluents to public treatment facilities, and the greatest cost impact would therefore come from rising public waste treatment charges. (Lynch-Wisconsin)
W78-03053

SOME RESULTS OF STUDIES ON THE CYCLE OF SUBSTANCES AND BIOLOGICAL SELF-PURIFICATION OF BODIES OF WATER, (IN RUSSIAN),
Akademiya Nauk SSSR, Moscow. Inst. Biologii Vunutrennykh Vod.
M. M. Kamshilov.
Gidrobiol Zh 13(1), p 5-13, 1977.

Descriptors: *Biological purification, *Self-purification, *Volga River(USSR), Phenol analysis, Organic matter, Aquatic plants, Biomass, Bodomarina, Bodo-saltans, Flagellates, Lemna-gibba, Lemna-minor, Lemna-trisulca, *Photosynthesis, Phytoplankton, Pleuromonas-jaculans.

When studying the floristic composition (Pleuromonas jaculans, Bodo saltans, B. marina, Lemna minor, L. gibba, L. trisulca) of the Volga, its trophy and saprobic character increase. Investigation of photosynthetic pigment composition in phytoplankton from water bodies of different types permitted the calculation of their average content per unit of phytoplankton biomass and the detection of the main factors on which it depends. A role of colorless flagellates is elucidated in the biotic cycle of lobes and streams. Phenol analysis of biological factors of organic matter destruction in aquatic media should be conducted from view points of biogeocenology.-Copyright 1978, Biological Abstracts, Inc.
W78-03070

EFFECT OF WIND AND RAIN ON SURFACE REAERATION,
Asian Inst. of Tech., Bangkok (Thailand).
For primary bibliographic entry see Field 2H.
W78-03073

WASTE NUTRIENT RECYCLING USING HYDROPONIC AND AQUACULTURAL METHODS,
California Univ., Los Angeles. Office of Environmental Science and Engineering.
For primary bibliographic entry see Field 5D.
W78-03077

USE OF ARTHROPODS TO EVALUATE WATER QUALITY OF STREAMS,
Wisconsin Dept.of Natural Resources, Madison.
For primary bibliographic entry see Field 5A.
W78-03078

FINGER-FILL CANAL STUDIES, FLORIDA AND NORTH CAROLINA,
Environmental Protection Agency, Athens, GA. Surveillance and Analysis Div.
D. B. Hicks, T. R. Cavinder, B. S. Carroll, R. L. Raschke, and P. M. Murphy.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-265 645, Price codes: A19 in paper copy, A01 in microfiche. Report No. EPA-904/9-76/017, May, 1975. 446 p, 112 fig, 42 tab, 83 ref, 5 append.

Descriptors: *Wetlands, *Florida, *North Carolina, *Canals, *Land development, Environmental effects, Baseline studies, Sediments, Nutrients, Mathematical models, Water quality control, Water pollution control, Effluents, Wastewater(Pollution), Ecosystems, *Finger-fill canals, Flushing rates.

Four areas in Florida (Punta Gorda, Big Pine Key, Marathon, and Panama City, and one in southeast-

ern North Carolina (Atlantic Beach) were assessed for water quality effects of finger-fill canal developments. Coastal wetlands in the southeastern U.S., which are ecologically valuable transition zones between uplands and estuaries, are currently being developed for artificial water front real estate by dredging canals via two methods: (1) in the Carolinas and northern Gulf coastal area an access channel is often excavated through the wetlands, from which branches a perimeter canal along the marsh upland ecosystem, or a series of canals through the uplands; (2) in the Florida peninsula and keys, canals are generally excavated within the wetlands, with the spoil used to cover adjoining wetlands in order to raise elevation for residential development. Both methods adversely affect both wetlands and water quality; the second method not only permanently eliminates the wetland ecosystem, but creates a new system that usually negatively affects maintenance of a quality ecosystem. Based on extensive water quality, flushing rate, and nutrient exchange data, it is recommended that (1) coastal canal developments be restricted to nonwetland areas; (2) effects on shallow aquifers be assessed during planning; (3) canal depths should not exceed 4-6 ft below mean low water; and (4) no sewage effluents be discharged directly into finger-fill canal waters. (Lynch-Wisconsin)
W78-03079

REMOVAL OF ALGAE IN NATURAL BODIES OF WATER,
California Univ., Berkeley. Coll. of Engineering.
W. J. Oswald.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-253 086, Price codes: A08 in paper copy, A01 in microfiche. Report No. EPA-600/3-76-059, May 1976. 140p, 41 fig, 31 tab, 18 ref. EPA802670;RWPCA16010EKS.

Descriptors: *Algae, *Aquatic weed control, *Algal control, *Harvesting of Algae, California, Mechanical control, Equipment, Eutrophication, Nutrients, Anabaena, Skimming, Cyanophyta, Lakes, Costs, Cost-benefit analysis, Nuisance algae, *Clear Lake(CA), Aphanizomenon, Microcystis.

A device for removing floating bluegreen algae from Clear Lake (CA) has been designed on the basis of several tests, and plans are underway for its construction. As most microalgae are highly hydrophilic and are repelled by intruded surfaces, the pickup unit must isolate the algae with little disturbance of the water surface. Once isolated in the unit, the algae is pumped to a screening system for concentration, and then to sand beds for dewatering. Clear Lake, a eutophic lake 130 km north of San Francisco, has a surface area of 17,000 ha and an average depth of 9 m. Flood waters from annual winter rains enter the lake carrying large quanities of nitrate, nitrite, ammonium, organic nitrogenous materials, phosphorous compounds, and trace minerals, thereby creating an ideal medium for algal growth. Removal methods based on skimming are feasible and cost-effective because of the natural flotation of the algal combined with wind-induced concentrations near the shores; concentrations range from 1,000-20,000 mg/l, compared with an average of 10 mg/l for the lake, and are 1-5 cm deep. About 2% of the lake's surface would have to be skimmed continually during the growing season to significantly reduce the scum problem; 1,000-5,000 metric tons of algae would probably be removed each year. Annual building and operating costs would be $50-60,000. A single permanent harvesting station would cost $120-150,000. Benefits from tourism and property values should amount to $200,000 as a result of algae control. (Lynch-Wisconsin).
W78-03080

CONTROL THEORY APPLIED TO NATURAL AND ENVIRONMENTAL RESOURCES; AN EXPOSITION,
Arizona Univ., Tucson. Dept. of Economics.
For primary bibliographic entry see Field 6A.
W78-03081

ON RECYCLING AS A MOOT ENVIRONMENTAL ISSUE,
Princeton Univ., NJ. Dept. of Economics.
W. J. Baumol.
Journal of Environmental Economics and Management, Vol. 4, p 83-87, 1977. 1 fig, 4 ref.

Descriptors: *Recycling, *Waste treatment, *Resource allocation, *Economics, Environmental effects, Pollution abatement, Resources, Natural resources, Conservation, Economic efficiency, Air pollution, Water pollution, Taxes, Model studies, Cost-benefit analysis.

Recycling advantages/disadvantages are weighed and serious questions are raised concerning whether recycling truly contributes to resource conservation or pollution abatement. Recycling is not free; it uses up resources to produce other resources, and it is therefore not always certain that the marginal net product must be positive. A model is produced in which, other variables being equal, exogenously induced recycling must always reduce resources supply. The definition of recycling--purification and reconstitution of a previously-used raw material--does not include returnable bottles or discouragement of elaborate packaging. Legislation has actually favored use of virgin materials over recycled substitutes through tax advantages. Many items, such as plastics, do not readily lend themselves to recycling, while processing of other materials is difficult. In the absense of externalities, competitive general equilibrium must produce an optimal quantity of recycling, and the introduction of a recycling inducement would, if anything, reduce social welfare. Although waste disposal does generate externalities, the recycling processes themselves generate externalities. The use of garbage as fuel, for example, is likely to produce air pollution, especially in the form of particulates, and unburnable acid remains could poison land and waterways. (Lynch-Wisconsin)
W78-03086

WATER RESOURCES RESEARCH PROGRAM. TRANSPORT AND DISPERSION OF OIL-REFINERY WASTES IN THE COASTAL WATERS OF SOUTHWESTERN LAKE MICHIGAN (EXPERIMENTAL DESIGN--SINKING-PLUME CONDITION),
Argonne National Lab., IL. Energy and Environmental Systems Div.
For primary bibliographic entry see Field 5B.
W78-03092

ENVIRONMENTAL BASELINE FOR MAUMEE BAY,
National Oceanic and Atmospheric Administration, Ann Arbor, MI. Great Lakes Environmental Research Lab.
For primary bibliographic entry see Field 5A.
W78-03095

RISK ANALYSIS METHODS FOR DEEPWATER PORT OIL TRANSFER SYSTEMS,
Transportation Systems Center, Cambridge, MA.
For primary bibliographic entry see Field 5C.
W78-03098

IMPLICATIONS OF THE U.S. COAST GUARD SEGREGATED BALLAST RETROFIT RULING ON IMPORT ALTERNATIVES AND POLLUTION OF THE MARINE ENVIRONMENT,
Operations Research, Inc., Silver Spring, MD.
R. Dayton, P. Daniels, L. Stoehr, and J. Kirkland.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A034 840, Price codes: A07 in paper copy, A01 in microfiche. Coast Guard Office of Merchant Safety Report No CG-M-06-77, October 1976. 126 p, 9 fig, 40 tab, 25 ref, 4 append. ONR-N00014-76-C-0918.

Descriptors: *Oil pollution, *Water pollution sources, *Water pollution effects, Environmental effects, Resources development, *Outer Continental Shelf, *Ballast disposal, Oil transport.

In May of 1976, the U.S. Coast Guard published an advance notice of proposed rule-making which would require the backfitting of segregated ballast tanks (SBT) on all tankers engaged in importing oil to the United States which displace 70,000 DWT or more. This study was commissioned to: (1) Estimate the economic costs and environmental benefits to be derived from implementation of the regulation, and (2) Examine the economic feasibility of alternative oil importing schemes (i.e., transshipment and lightering) which could circumvent the proposed regulation. The approach taken by ORI was to define in detail the U.S. oil import transportation system for a base year, 1975, in terms of the volume of crude and products delivered, the number and size of tankers involved, and the tankers' last port of call. Similar scenarios were developed for the following: (1) 1980 Status Quo, (2) SBT Retrofit Required (noncompliance), (3) 1980 Status Quo Plus Deepwater Ports, (4) 1980 SBT Retrofit Required Plus Deepwater Ports (non-compliance), (5) 1980 SBT Retrofit Required (compliance), (6) 1980 SBT Retrofit Plus Deepwater Ports (compliance). Within each scenario, required freight rates for tankers of various sizes were developed, and operational and accidental oil spills were calculated. It was determined that the 16% of the tankers in the present fleet which are subject to the SBT ruling, would very likely circumvent the retrofit requirement by lightering which is the most coast-effective transportation mode. There is no evidence that the proposed SBT ruling will be effective in reducing oil pollution of the marine environment. (Sinha-OEIS)
W78-03099

PROBABILISTIC TRAJECTORY ASSESSMENTS FOR OFFSHORE OIL SPILLS IMPACTING LONG ISLAND,
Massachusetts Inst. of Tech., Cambridge.
For primary bibliographic entry see Field 5B.
W78-03100

BASIC REMOTE SENSING INVESTIGATION FOR BEACH RECONNAISSANCE,
Environmental Research Inst. of Michigan, Ann Arbor.
For primary bibliographic entry see Field 2L.
W78-03107

TEMPORARY STORAGE AND ULTIMATE DISPOSAL OF OIL RECOVERED FROM SPILLS IN ALASKA,
Battelle Pacific Northwest Labs., Richland, WA.
For primary bibliographic entry see Field 5E.
W78-03110

ANALYSIS OF OIL SPILL TRENDS,
GKY and Associates, Alexandria, VA.
For primary bibliographic entry see Field 5B.
W78-03112

SCIENTIFIC-TECHNICAL PROGRESS AND IMPROVEMENT OF THE SANITARY STATE OF BODIES OF WATER IN REGIONS OF OIL-REFINING AND OIL PETROCHEMICAL PLANTS, (IN RUSSIAN),
Nauchno-Issledovatelskii Inst. Gigieny i Profzabolevanii, Ufa (USSR).
F. G. Murzakaev, and A. A. Mingazetdinov.
Gig Sanit 7, p 7-10, 1976.

Descriptors: *Oil wastes, *Industrial wastes, *Belaya River(USSR), *Water pollution control, Chemical wastes, Organic wastes, Water quality standards, Public health.

Data showed that oil refining and oil chemical enterprises in Bashkirya (USSR) were carried out on a wide complex of technological, sanitary-technical and organizational measures to decrease the use and discharge of water and diminish the extent of contamination of the Belaya river with oil, oil products and other compounds.--Copyright 1978, Biological Abstracts, Inc.
W78-03145

TREATMENT SYSTEM FOR OILY WASTES.
For primary bibliographic entry see Field 5D.
W78-03184

THE IMPORTANCE OF THE 'EFFLUENT-FEE-LAW' EXEMPLIFIED BY THE CALCULATION FORMULA FOR THE PULP INDUSTRY (DIE BEDEUTUNG DES ABWASSERAB-GABENGESETZES NACH MASSGABE DER BEMESSUNGSFORMEL FUER DIE ZELLSTOF-FINDUSTRIE),
Papierwerke Waldhof-Aschaffenburg A. G., Raubling (Switzerland).
K. Hoch.
Muenchner Beitraege zur Abwasser-, Fischerei- und Flussbiologie, Vol 27, p 59-70, 1977. 8 fig.

Descriptors: *Costs, *Legislation, *Pulp wastes, *Pulp and paper industry, *Cellulose, Fibers(Plant), Wood wastes, Water pollution control, Pollution abatement, Industrial wastes, Waste water treatment, *West Germany.

In West Germany cellulose is obtained from sulfite process wood pulp. The cellulose factories were divided into four groups according to age. The first group included the newest plants with pollution control installations, while Group 4 included the oldest plants with no concentration tanks nor incinerators. In 1973 the 14 West German plants produced 719,000 tons of Cellulose. Of these, three were in Group 2 while two were in Group 4. The substances in the waste water from the cellulose production were dissolved lignin, organic acids, hemicelluloses, polysaccharides, and carbohydrates (hexoses, pentoses). The 'Effluent Fine Law' sets up a system of 'damage units' based upon the amount of pollutants produced. The fines charged for polluted effluents will come to 40.8% of the total value of the cellulose production in the transition period of January 1, 1976 to December 31, 1979. (Schwartz-FIRL)
W78-03191

POLLUTION ABATEMENT=GOOD HOUSEKEEPING=ENERGY/MATERIAL CONSERVATION,
For primary bibliographic entry see Field 5D.
W78-03196

6. WATER RESOURCES PLANNING

6A. Techniques Of Planning

MULTIPLE-OBJECTIVE PLANNING OF WATER RESOURCES,
Technische Hochschule, Aachen (West Germany).
For primary bibliographic entry see Field 6B.
W78-03047

CONTROL THEORY APPLIED TO NATURAL AND ENVIRONMENTAL RESOURCES; AN EXPOSITION,
Arizona Univ., Tucson. Dept. of Economics.
V. L. Smith.
Journal of Environmental Economics and Management, Vol 4, p 1-24, 1977. 13 fig, 31 ref.

Descriptors: *Economics, *Model studies, *Natural resources, Resource allocation, Capital, Equations, Recreation, Waste disposal, Recycling, *Control theory, Extinction, Non-renewable resources, Renewable resources.

Four control theory models are applied to the dynamic economic analysis of natural and environmental resources with emphasis on their technical and decentralized interpretive similarity. The four cases are replenishable resources, exhaustible resources, wilder-ness recreational resources, and environmental waste and recycling. Technology production, and consumption of natural resource products is analyzed using simple two-commodity dynamic economic models. Renewable, nonrenewable, and amenity resource use are treated as closely related problems of optimal capital allocation over time. Thus, non-renewable resources and the problem of exhaustion are simply zero growth cases of renewable resources and problem of species extenction. Just as exhaustion can be optimal, so can extinction. Since everything cannot be saved, society must make choices. A major value to man of preservation is retention of the gene pool, as in the case of the bison which, saved from extinction, is now being productively crossed with beef cattle. Wilderness use is treated as a problem of managing the regeneration of ecological capital, and waste recycling is treated as part of the problem of optimal regeneration of clean environmental capital. Waste accumulation is a joint consequence of household and decisions of firms to litter, that is, let waste degrade naturally instead of recycling it into production. Waste residue ultimately accumulates as a 'bad' from which there is no escape except through recycling. (Lynch-Wisconsin)
W78-03081

AN EXPERIMENTAL APPROACH TO PUBLIC PARTICIPATION FOR THE NORTH CAROLINA WATER PLAN.
North Carolina Dept. of Natural and Economic Resources, Raleigh. Div. of Resource Planning and Evaluation.
For primary bibliographic entry see Field 6B.
W78-03084

6B. Evaluation Process

TRANSMISSION LINE RIGHTS-OF-WAY MANAGEMENT,
Mississippi State Univ., Mississippi State. Dept. of Wildlife and Fisheries.
D. H. Arner.
Fish and Wildlife Service, Biological Services Program, Report No. FWS/OBS-76/20.2, March 1977, 12 p. 33 ref, 1 fig.

Descriptors: *Right-of-way, *Transmission lines, *Land management, *Electric power, *Wildlife habitats, *Habitat improvement, *Multiple-Purpose Projects, *Wildlife conservation, Transmission(Electrical), Herbicides, Environmental effects, Fish conservation, Biological communities.

Proper management of transmission line rights-of-way (ROW) to maximize benefits to fish and wildlife resources is highly desirable because a large amount of land is now preempted by these ROW, and it is anticipated that future growth of electric generating capacity will require additional large acreages of land for transmission line ROW. This paper presents some current ROW management practices and their costs, the bases for selecting a specific management technique, and some possible management goals to benefit fish and wildlife in various local situations. (Katz)
W78-02730

METHODOLOGY AND MEASUREMENTS OF BENEFITS OF POLLUTION ABATEMENT IN A COMMUNITY,
Pittsburg Univ., PA. Graduate School of Business.
For primary bibliographic entry see Field 5G.
W78-03044

IMPACTS OF RECREATION IN THE COASTAL ZONE: ECONOMIC IMPACT AND NEEDS OF WISCONSIN'S GREAT LAKES BOATERS-1975,
Wisconsin Univ.-Madison. Recreation Resources Center.
A. Somersan.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-263 933, Price codes: A04 in paper copy, A01 in microfiche. Report No. NOAA-77010606, July, 1976. 52 p, 3 tab, 4 append.

Descriptors: *Boating, *Wisconsin, *Great Lakes, *Recreation demand, *Economic impact, Recreation, Recreational facilities, Fishing, Coasts, Marinas, Lake Michigan, Social aspects, Lake Superior, Green Bay(WI).

Wisconsin's boaters on Lakes Michigan and Superior spent about $12.7 million during the 1975 summer boating season; $9.3 million (73%) was spent directly in coastal communites. Public ramp users spent $6.6 million, while marina users spent $6.1 million. Over 80% of the boaters listed fishing as their primary purpose in boating. Ramp users spent 44% of total expenditures on lodging, restaurants, and sporting goods; marina users spent 60% on food and beverages. Service stations accounted for 10-18% of spending. Total spending of ramp users in 16 coastal cities ranged from $1,812 in Oconto to $1,253,814 in Sturgeon Bay; average spending per party per trip varied from $9.55 in Oconto to $166.61 in Bayfield. Milwaukee had the highest number of boating parties, 42,085. Marina users' total spending in 27 communities was highest in Milwaukee with $1,401,215, and average spending per party was $21-44. More and improved launching facilities was the greatest need expressed; in 1975, for example, there were 1,031 boaters on marina waiting lists. Ramp users complained most of long waits for launching and pulling out of the water, plus limited facilities (particularly parking, toilets, and navigational information); marina users expresses the need for more docks, toilets, services, and supplies. (Lynch-Wisc)
W78-03045

MULTIPLE-OBJECTIVE PLANNING OF WATER RESOURCES,
Technische Hochschule, Aachen (West Germany).
F. G. Rohde, and G. Rouve.
AMBIO, Vol 6, No 1, p 83-86, 1977. 8 fig, 4 tab, 6 ref.

Descriptors: *Multiple purpose projects, *Planning, *Water policy, *Water resources, *Water resources development, Water management(Applied), Systems analysis, Environmental effects, Regional development, National income, Decision theory, National economic development, Water Resources Council, Multiple-objectives planning.

Social and environmental goals, elaburated in noneconomic formats, must be included in water resources planning and management. In 1970 the U.S. Water Resources Council proposed an operational concept embracing these objectives: (1) National Economic Development (NED), (2) Environmental Quality (EQ), and (3) Regional Development (RD). Concepts and techniques from systems analysis and decision theory can be useful in meeting these goals. Project effects with respect to NED are usually evaluated by cost-benefit analysis, with costs and benefits measured in terms of changes in national income. The most formidable accounting problem involves external economies, i.e., indirect or secondary costs and benefits of a

project. There is no consensus concerning how to meet EQ objectives. The Water Resources Council scheme describes a plan's environmental quality with quantifiable parameters (P), dimensionless quality ratings (q), and dimensionless significance ratings (s). This evaluation leads to a great amount of information rather than to one single value. The Batelle scheme summarizes the overall quality of a plan into a single parameter, the Environmental Quality Parameter (EQ). The main aspects of RD objectives are regional redistribution of income and of population, and planning success may be measured monetarily as well as in effects on employment, population, and recreation. (Lynch-Wisconsin)
W78-03047

IMPACT UPON LOCAL PROPERTY TAXES OF ACQUISITIONS WITHIN THE ST. CROIX RIVER STATE FOREST IN BURNETT AND POLK COUNTIES,
Wisconsin Dept. of Natural Resources, Madison.
M. H. Rosner.
Technical Bulletin No. 101, 1977, 24 p. 1 fig, 31 tab, 9 ref.

Descriptors: *Taxes, *Land use, Wisconsin, Forests, Recreation, Non-structural alternatives, Regional economics, *St. Croix River State Forest(WI), *Property taxes, Land acquisition.

An assessment of projected effects of land acquisition in the St. Croix State Forest, Wisconsin, between 1970 and 1980 by the National Park Service (NPS) and Wisconsin Department of Natural Resources (DNR) found that the net effect on local property taxes would be lower taxes in five towns, no change in one, and a small increase in a seventh. NPS purchases alone would increase taxes very slightly in each town, while DNR acquisitions alone would decrease taxes, due to its program of payments to towns in lieu of property taxes. Public land acquisition in Wisconsin does not result in increased local taxes because: (1) county tax bases are very large; (2) lower tax bases mean increased school aid; (3) the state payment can be in lieu of tax program; and (4) any initial change in local tax rate will be partially offset by state shared taxes and tax credits. The state makes up for most of the lost tax base, through increased school aid, in-lieu payments, shared taxes, and tax credits. Ultimately, the loss is borne by all the state's taxpayers, but at a very small increase to each. Of a total of 33,127 acres within the state forest boundaries, 27,999 are scheduled for acquisition by DNR, 2,577 by NPS for the National Scenic Riverway, and 2,251 will be retained by Northern States Power. Between 1970 and 1975 DNR acquired 9,932 acres at $374,807 and NPS 328 acres at $133,900 (1974 equalized valuation). (Lynch-Wisconsin)
W78-03049

THE RELATIONSHIP BETWEEN RESOURCE USE AND ECONOMIC GROWTH: FORCES DETERMINING THE FUTURE,
Louisiana State Univ., Baton Rouge. Center for Wetlands Resources.
K. E. F. Watt.
Sea Grant Publication No. LSU-R-76-008, June 1976. 19 p. 6 fig, 4 tab.

Descriptors: *Economics, *Wages, *Gross national product, Social aspects, Labor supply, Prices, *Resource depletion, *Resource prices.

A review of resource use and economic growth suggests that a wide variety of U.S. economic problems are the result of too high a value being placed on labor relative to resources, resulting in resource depletion, pollution, unemployment, crime, capital, misallocation, low economic growth, among other difficulties. Two broad strategies are suggested to break out of the trap: Price mechanism and taxation schemes. Conventional wisdom argues that with tax revenues the government could finance conservation of resources or development of new resources. The counter-argument is that government is vulnerable to interest groups that may not want a particular resource conserved or developed. The other approach is to get the government out of conservation and development and let prices float upwards without regulation. High resource prices would encourage entrepreneurs to develop a wide range of new energy and resource-acquisition systems, including solar, geothermal, and wind energy, mariculture and intense-cultured vegetables. However all this depends on a downward shift in the average level of wages relative to resource prices. It is concluded that ordinary cultural beliefs on how to attain the good life are defective and need to be changed. (Coyle-Wisconsin)
W78-03054

TECHNOLOGY IS NOT ENOUGH: THE PROVISION AND MAINTENANCE OF APPROPRIATE WATER SUPPLIES,
A. Pacey.
Aqua, Vol. 1, No. 1, p. 1-58, 1977. 23 fig, 3 tab, 18 ref.

Descriptors: *Potential water supply, *Water policy, *Institutional restraints, *Technology, Rural sociology, Potable water, Environmental sanitation, Human diseases, Pumps, Equipment, Regional development, *Western technology, *Developing countries, Technology transfer.

A review of water technology for undeveloped non-western countries concludes that any particular level of technology only has a role in a specific environment and socio-economic context. The most appropriate technology is often missed because the range of options offered to rural communities and considered by Asian, African and South American governments is too restricted. There are technologies and approaches with high or low capital costs, variable labor inputs and maintenance needs. Almost every situation lends itself to at least some improvement, even if funds and skills are severely limited. The hope of technology is that going back to basic objectives of water improvement and disregarding technical standards formulated elsewhere, and by choosing among the vast range of technological devices those which are most appropriate to the particular situation, water supplies for the poor nations can be steadily improved. A technically, appropriate water supply development scheme is described in which equipment is selected according to three criteria groups: (1) health and sanitary appropriateness; (2) functional appropriateness; and (3) environmental appropriateness. (Coyle-Wisconsin)
W78-03059

CONTROL THEORY APPLIED TO NATURAL AND ENVIRONMENTAL RESOURCES; AN EXPOSITION,
Arizona Univ., Tucson. Dept. of Economics.
For primary bibliographic entry see Field 6A.
W78-03081

NATURAL RESOURCES POLICY 1975-1985,
New Mexico Univ., Albuquerque. Dept. of Economics.
For primary bibliographic entry see Field 6E.
W78-03083

AN EXPERIMENTAL APPROACH TO PUBLIC PARTICIPATION FOR THE NORTH CAROLINA WATER PLAN.
North Carolina Dept. of Natural and Economic Resources, Raleigh. Div. of Resource Planning and Evaluation.
Technical Report No II-05-D(1), August 1974. 9 p, 33 ref, 14 append.

Descriptors: North Carolina, *Planning, *Water resources, *Social aspects, Water resources development, Methodology, River basins, River basin development, *Public participation, Public relations, *North Carolina Water Plan, Citizen participation.

The 'interaction/dialogue' approach to public participation in water resources planning is recommended in connection with the Neuse River Basin Plan, a part of the North Carolina Water Plan. This approach employs workshops, interviews, advisory boards, study groups, and public meetings to include the public in planning-agency decision-making. An alternative approach which limits public participation to reacting to decisions of the planning agency was rejected as inadequate. In the Neuse River Basin project, the Citizen's Advisory Committee (CAC) was included as a full partner with the Water Resource Planning Section (WRPS). Three joint meetings for educational and planning purposes were, however, poorly attended; nevertheless a small nucleus of people emerged, who seemed committed to carrying on the program without aid from the WRPS. At the August meeting this group decided to schedule public meetings, set up a newsletter for the Neuse project, and hold quarterly CAC-WRPS meetings. Recommendations are: (1) the Department of Natural and Economic Resources (DNER) should announce an official policy goal of public participation; (2) a four-person staff should be hired by the DNER to carry out this goal; (3) ample advance time should be allowed for public participation; (4) WRPS staff should be educated in the need for public participation; (5) a CAC should be created in each basin. (Lynch-Wisconsin)
W78-03084

6C. Cost Allocation, Cost Sharing, Pricing/Repayment

THE APPLICATION OF WIND ENERGY SYSTEMS TO DESALINATION,
Williamson Engineering Associates, Inc., Navarre, FL.
For primary bibliographic entry see Field 3A.
W78-02701

COMPETITIVE PRICE BEHAVIOR OF AN EXHAUSTABLE RESOURCE WHERE THE RATE OF SUBSTITUTION IS CONSTRAINED,
D. A. Hanson.
International Economic Review, Vol 18, No 1, p 135-149, February 1977. 6 fig, 5 ref. GK-42089.

Descriptors: *Resource allocation, *Investment, *Elasticity of supply, *Elasticity of demand, Competitive price, Natural resources, *Competitive market, *Capital accumulation, *Alternative process, *Backstop technology, Price behavior.

One approach to the theory of price behavior of an exhaustible natural resource in a competitive market is to relate the price of the resource to the cost of producing a perfect substitute from a process called a backstop technology. It is assumed capital can be accumulated instantly when the natural resource is exhausted. The approach taken in this paper is to introduce a constraint on the rate of investment. The constraint implies that production capacity for investment in the backstop technology is fixed. Moreover, capacity does not adjust in the face of abnormally high profits. These profits presumably accrue to factors in short supply, such as labor and specialized materials. The maximum price that the natural resource will attain will not be limited by the cost of production using the backstop technology. The price must reach the production cost for the technology before the resource is exhausted in order to build capacity in advance. If demand is perfectly inelastic, price will make a discontinuous drop when the resource is exhausted. If demand is not perfectly inelastic, price will be continuous but capacity in the

backstop technology will not be at equilibrium level when the resource is exhausted. (Coyle-Wisconsin)
W78-03046

NOTES ON THE SYMMETRY OF TAXES AND SUBSIDIES IN POLLUTION CONTROL,
Harvard Inst. of Economic Research, Cambridge, MA.
For primary bibliographic entry see Field 5G.
W78-03048

IMPACT OF USER CHARGES APPLIED TO INLAND WATERWAYS.
Ernst and Ernst, Washington, DC.
For primary bibliographic entry see Field 5G.
W78-03050

COST OF CLEANING THE ENVIRONMENT.
Environmental Protection Agency, San Francisco, CA. Region IX.
For primary bibliographic entry see Field 5G.
W78-03051

FINANCIAL CRITICAL FACTORS ANALYSIS.
Miami Valley Regional Planning Commission, Dayton, OH.; and Linton and Co., Inc., Washington, DC.
For primary bibliographic entry see Field 5D.
W78-03052

ECONOMIC ANALYSIS OF EFFLUENT GUIDELINES FOR THE SOAP AND DETERGENT INDUSTRY. PHASE I,
Environmental Protection Agency, Washington, DC. Office of Planning and Evaluation.
For primary bibliographic entry see Field 5G.
W78-03053

COST REDUCTION FOR WASTEWATER TREATMENT UTILIZING WATER MANAGEMENT AT HOLSTON ARMY AMMUNITION PLANT,
DARCOM Intern Training Center, Taxarkana, TX. Product/Production Graduate Engineering Program.
D. J. Kravec.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A025 118, Price codes: A04 in paper copy, A01 in microfiche. Report No DARCOM-ITC-02-08-76-201, Final Report, May 1976. 47 p, 2 fig, 26 tab, 9 ref.

Descriptors: *Benefit-cost analysis, *Waste water treatment, Industrial water, Industrial effluents, Water quality control, Water management(Applied), Pollution abatement, Regulation, Industrial wastes, Water pollution, Water pollution sources, Rivers, Filtration, Trickling filters, Activated carbon, Adsorption, Water clarification, Denitrification, Chlorination, Cost analysis, Tennessee, *Holston Army Ammunition Plant(Tenn), Ammunition plants(Army).

A proposed wastewater treatment facility to meet new pollution standards at the Holston Army Ammunition Plant (Tenn.) is evaluated in terms of possible cost reductions to be effectuated by its use. Since the plant normally operates at 50% mobilization, the contractor proposed staged construction under which an initial facility would be installed to handle wastes at 50% mobilization, adequate in the absence of a national emergency. Total construction costs would be $24 million. This report analyzes possible savings if a 50% in-house reduction in hydraulic loading (quantity of wastewater) or contaminant loading (chemical contaminants per unit of wastewater) could be made. The facility includes steps for pretreatment, neutralization, denitrification, trickling filters, final clarification, sludge treatment, dual media filtration, breakpoint chlorination, activated carbon adsorption, and discharge into the Holston River. At 100% mobilization a 50% in-house reduction in hydraulic loading would result in savings of $.44 per 1000 gallons of wastewater treated over 5 years, compared with only $.18 for a 50% reduction in contaminant loading. The savings in the first case is due to reduction in equipment size, not possible in the second case. At 50% mobilization (staged construction), the savings would be $.42 for hydraulic load reduction, and $.14 for contaminant load reduction. The report concludes that the facility as designed is not the most cost effective, and fails to consider the cost and effects of improvements in existing equipment. (Lynch-Wisconsin)
W78-03085

6D. Water Demand

IMPACTS OF THE WESTERN DROUGHT ON REGIONAL ELECTRICITY GENERATION.
Federal Power Commission, Washington, DC.
For primary bibliographic entry see Field 3E.
W78-02879

IMPACTS OF RECREATION IN THE COASTAL ZONE: ECONOMIC IMPACT AND NEEDS OF WISCONSIN'S GREAT LAKES BOATERS-1975,
Wisconsin Univ.-Madison. Recreation Resources Center.
For primary bibliographic entry see Field 6B.
W78-03045

COMPETITIVE PRICE BEHAVIOR OF AN EXHAUSTABLE RESOURCE WHERE THE RATE OF SUBSTITUTION IS CONSTRAINED,
For primary bibliographic entry see Field 6C.
W78-03046

6E. Water Law and Institutions

NEW RIVER (HEARINGS ON S. 158, WHICH PROVIDE FOR DESIGNATION OF A SEGMENT OF THE NEW RIVER WITHIN THE NATIONAL WILD AND SCENIC RIVERS SYSTEM).
Hearings--Subcomm. on the Environment and Land Resources, Comm. on Interior and Insular Affairs, U.S. Senate, May 20-21, 1976. 297 p.

Descriptors: *Wild Rivers Act, *Powerplants, *Hydroelectric plants, *North Carolina, *Conservation, Economic impact, Wild rivers, Electric powerplants, Social aspects, Wildlife conservation, National parks, National forests, Natural resources, Protection, Recreation, Scenery, Federal government, State governments, Water resources, Rivers, Natural streams, Wildlife, *New River(NC).

Hearings were held before the Senate Subcommittee on the Environment and Land Resources to consider legislation to designate a segment of the New River as a Potential component of the National Wild and Scenic Rivers System. The same legislation would also revoke a license issued by the Federal Power Commission (FPC) for the construction of the Blue Ridge Power project. Testimony was given by numerous federal, state, and local officials as well as private parties. Proponents of the legislation testified that construction of the power plant would drive 3,000 people from their lands and seriously hamper the lifestyle of the 50,000 who remained near the project. In addition, the historic value of one of the oldest river valleys in the world would be lost forever. The proposed power plant was described as totally inefficient and more of a burden than a benefit in solving the nation's energy problems. Opponents of the bill questioned the propriety of using the Wild and Scenic Rivers Act to block power plants and also highlighted the potential for a large electrical output without the aid of oil or gas. (Moorhouse-Florida)
W78-02819

DESIGNATION OF MISSOURI RIVER SEGMENT AS A WILD AND SCENIC RIVER (HEARINGS ON S. 1506).
Hearings--Subcomm. on National Parks and Recreation, Comm. on Interior and Insular Affairs, U.S. House Representatives, June 21, 1976, Serial No 94-64. 178 p.

Descriptors: *Wild rivers, *Wild Rivers Act, *Missouri River, *National recreation areas, *Conservation, Rivers, River beds, Federal government, River regulation, Resources, Water resources development, National parks, Natural resources, Scenery, Recreation facilities, Recreation, Facilities, National wildlife refuges, National forests, Economic impact.

The House of Representative's subcommittee on National Parks and Recreation held hearings on a bill to designate a segment of the Missouri River in Montana as a component of the National Wild and Scenic Rivers System. Numerous private and public interest groups submitted statements concerning the bill. The majority of comments supported passage citing the historical, archeological, geological, recreational, and scenic value of the river. Those opposed feared that reserving a 150-mile stretch of river would foreclose job opportunities by curtailing industrial development as well as raise property taxes due to the removal of large portions of land from the state tax rolls. (Moorhouse-Florida)
W78-02820

TO AMEND THE WILD AND SCENIC RIVERS ACT AND TO DESIGNATE CERTAIN LANDS AS WILDERNESS (HEARINGS ON S.3613, 3788, AND 2708).
Hearings - Subcommittee on the Environmental and Land Resources, Committee on Interior and Insular Affairs, U.S. Senate, September 24, 1976. 78 p.

Descriptors: *Rivers, *Wild Rivers Act, *National recreation areas, *Conservation, Tennessee, Montana, Wyoming, Wild rivers, River beds, Federal government, River regulation, Resources, Water resources, National parks, Natural resources, Scenery, Recreation facilities, Recreation, National wildlife refuges, National forests.

On September 24, 1976 the Senate subcommittee on the Environment and Land Resources held hearings on bills to add segments of the Obed River in Tennessee and the Flathead River in Montana to the National Wild and Scenic Rivers System and also to designate a wilderness area in the Shoshone National Forest in Wyoming. Testimony was taken from Senators and Representatives of the affected states as well as the Departments of Interior and Agriculture and private interest groups. The great weight of opinion favored the bills. However, the Department of Agriculture recommended delay in passage until the Executive branch completed a study and the President was given the opportunity to make recommendations. The only drawback cited as a result of the bill's passage was the possibility of foreclosing hydroelectrical generation from the rivers. (Moorhouse-Florida)
W78-02821

DESIGNATION OF OBED RIVER SEGMENT AS A WILD AND SCENIC RIVER (HEARINGS ON H.R. 13067 AND 13303).
Hearings--Subcomm. on National Parks and Recreation, Comm. on Interior and Insular Affairs, U.S. H. Rep. June 21, 1976, Serial No. 94-65. 132 p.

Descriptors: *Conservation, *Wild rivers, *Wild Rivers Act, *National recreation areas, *Tennessee, Rivers, River beds, Federal government, River regulation, Public lands, Resources, Water resources development, National parks, Natural resources, Scenery, Recreation facilities, Recreation, Facilities, National wildlife refuges, National forests, Safety, Hazards, *Obed River(Tenn).

The House of Representative's subcommittee on National Parks and Recreation held hearings concerning the inclusion of a segment of the Tennessee Obed River into the National Wild and Scenic Rivers System. Numerous public and private environmental groups spoke in favor of the proposal. Although most comments were general, testimony from the Tennessee Citizens for Wilderness Planning specified several major threats to the river's future in the absence of this legislation. These threats include dams, stripmining, oil and gas wells, timber cutting, real estate development, and over-use. The only dissenting opinion was expressed by the Tennessee Association of Rescue Squads who viewed the river as a dangerous recreation area. (Moorhouse-Florida)
W78-02822

NATIONAL OCEAN POLICY (OVERSIGHT TO EXAMINE GENERAL OCEAN POLICY FOR THE UNITED STATES; LAW OF THE SEA CONFERENCE BRIEFING.
Hearings--Subcomm. on Oceanography--Comm. on Merchant Marine and Fisheries, U.S. House of Representatives, Sept 9, 16, 17, June 15, 1976, Serial No 94-43. 210 p.

Descriptors: *Law of the Sea, *Research priorities, *Future planning(Projected), *Legislation, *Oceans, Water law, Legal aspects, International law, Governmental interrelations, Decision making, Governments, Federal government, Institutions, United States, Political aspects, Programs, Water resources development, Conferences, Oceanography.

The purpose of these hearings was to receive testimony to describe the position of the United States with regard to the description and implementation of a national oceans policy, to determine what the nation's goals should be in that regard, and to identify acceptable methodologies for achieving those goals. Rather than attempting to evaluate draft legislation, the committee was concerned with discerning the need for, and the form and content of, future legislation establishing a national oceans policy. The committee also received testimony concerning the New York session of the Third Conference of the Law of the Sea. The briefing dealt with where the treaty negotiations stood with respect to specific issues. Testimony indicated the positions of the three conference committees dealing with revision of various portions of the proposed treaty. Of special interest to the committee was the report that dispute settlement provisions had been limited to four basic categories: arbitration; the International Court of Justice; the new Law of the Sea Tribunal; and specialized procedures for particular kinds of disputes. (Brightman-Florida)
W78-02823

COASTAL ZONE MANAGEMENT--PART 2 (OVERSIGHT ON REGULATIONS BEING PROPOSED BY THE OFFICE OF COASTAL ZONE MANAGEMENT FOR IMPLEMENTATION OF THE COASTAL ZONE MANAGEMENT ACT AMENDMENTS).
Hearings--Subcomm. on Oceanography--Comm. on Merchant Marine and Fisheries, U.S. House of Representatives, Dec 10, 1976, Serial No 94-48. 102 p.

Descriptors: *Coasts, *Shore protection, *Environmental effects, *Project planning, Seashores, Oceans, Coastal engineering, Regulation, Legal aspects, Water law, Governments, Administration, Planning, Water resources development, Loans, Financing, Grants, Local governments, Energy.

Oversight hearings were held by the Subcommittee on Oceanography of the House Committee on Merchant Marine and Fisheries to evaluate regulations to implement the Coastal Zone Management Act amendments of July, 1976. These amendments created and funded the coastal energy impact program. Oversight into both the method used to draft the regulations and whether the proposed regulations expressed the intent of Congress was deemed necessary because of governmental, industrial, and individual expressions of concern over the proposed regulations. Objections were aired concerning: (1) regulations providing for funding administration by the Office of Coastal Zone Management (OCZM) instead of at the state level as was the Congressional intent; (2) the rapid-fire manner in which new draft proposals were issued; (3) the paucity of time provided for comments on the final draft; and (4) certain limitations on the amounts of grant money available for planning which were included in the regulations with no Congressional authorization. Testimony by OCZM personnel presents that office's rationale for the particular regulatory language chosen in these areas. Statements from individuals representing various concerned groups are also included in the hearing report. (Brighton-Florida)
W78-02824

RECENT TANKER ACCIDENTS: LEGISLATION FOR IMPROVED TANKER SAFETY (PART 2; HEARINGS ON S. 182, S. 568, S. 682, S. 715, AND S. 898).
Hearings, Committee on Commerce, Science, and Transportation, U.S. Senate, March 8, 15, 16 and 18, 1977, Serial No 95-4. 1027 p.

Descriptors: *Oil spills, *Legislation, *Oil pollution, *United States, *Transportation, Law of the Sea, Environmental effects, Ships, Water pollution, Oceans, Foreign trade, Damages, Compensation, Legal aspects, Oil, Accidents, Hazards, Safety, Safety factors, Structural design, Harbors.

In March 1977, the Senate Committee on Commerce, Science, and Transportation held hearings regarding recent tanker accidents and proposed legislation for improved tanker safety. The committee was considering five proposed bills related to tanker safety. S. 182 sought to amend the Ports and Waterways Safety Act of 1972 in order to establish liability and compensation for damages from oil spills. S. 682 also sought to amend the Safety Act by increasing the use of United States vessels to carry imported oil. Another proposed amendment to the Act was S. 715 which further attempted to improve port and waterway safety. S. 568 regulated the transportation of oil by tankers in the domestic and foreign commerce of the United States. The hearings also included discussion of S. 898, a bill entitled 'Spill Prevention and Cleanup for Energy Transportation Systems Act of 1977'. It regulated tanker pollution liability and compensation and provided incentives to prevent tanker discharge. It also sought to restore any resulting damage of natural resources. The report includes complete texts of the bills and also contains the transcripts of the various witnesses before the committee. (Quarles-Florida)
W78-02825

ESTUARINE SANCTUARY GUIDELINES.
National Oceanic and Atmospheric Administration, Washington, DC.
For primary bibliographic entry see Field 2L.
W78-02826

ACREAGE LIMITATION (RECLAMATION LAW AND FEDERALLY-SUBSIDIZED WATER ON NONEXCESS LANDS).
Bureau of Reclamation, Washington, DC.
Federal Register, Vol 42, No 165, p 43044-49, August 25, 1977.

Descriptors: *Federal Reclamation Law, *Water, *Acreage, *Irrigated land, *Water allocation(Policy), Administration, Reclamation, Legal aspects, Administrative agencies, Administrative decisions, Management, Water control, Water sources, Irrigation, Irrigation programs, Water requirements, Water distribution(Applied), Farm units, Farms, Regulation.

The Bureau of Reclamation has proposed rules and regulations to administer the acreage limitation and other provisions of reclamation law. The proposed regulations embody important changes in current practices to enforce the excess land (160 acre limit) and other reclamation laws. These changes include: (1) imposing immediate residency requirements upon all new purchasers of excess land benefitting from low-priced federal water and the preparation of regulations which would reimplement the residency requirement in all cases; (2) tightening the criteria for determining qualified purchasers; (3) continuing department supervision over the sale price of land after it is sold into non-excess status; (4) limiting leasing of excess and non-excess lands benefited by low-priced federal water in order to promote farm operation by the actual owner; and, (5) the alteration of procedures by which excess lands are sold to allow a large number of prospective purchasers to participate in the reclamation program. These changes are designed to fulfill the purpose of reclamation law that low-priced federal water be used as a means of encouraging the establishment of genuine small family farms. (Kastner-Florida)
W78-02827

POLLUTION OF LAKE MICHIGAN AND ITS TRIBUTARY BASIN, ILLINOIS, INDIANA, MICHIGAN, AND WISCONSIN.
Environmental Protection Agency, Chicago, IL. Region V.
For primary bibliographic entry see Field 5G.
W78-02828

COASTAL ZONE PROBLEMS: A BASIS FOR EVALUATION,
Washington Univ., Seattle. Dept. of Business, Government and Society.
E. Englander, J. Feldman, and M. Hershman.
Coastal Zone Management Journal, Vol 3, No 3, p 217-36, 1977.

Descriptors: *Evaluation, *Management, *Coasts, *Programs, Environmental effects, Analysis, Analytical techniques, Project planning, Quality control, Theoretical analysis, Decision making, Coordination, Administration, Control, Planning, Comprehensive planning, Financing, State governments, Administratives agencies.

Although program evaluation is essential for effective planning and management, little evaluation has been done to date in the coastal management area because most programs are either in the formulation or early implementation stage. However, evaluation of state programs could be beneficial by pointing out program deficiencies for possible correction by identifying problems that other states could avoid, and by sharpening the state policies and goals. The authors' discussion of coastal problems perceived prior to passage of the Coastal Zone Management Act is separated into resource outcome problems and organizational process problems. The authors conclude that the most important group of problems for which criteria should be derived for a national coastal management evaluation effort are: extensive environmental pollution; intensive-use conflicts among competing uses; destruction of coastal habitat; lack of coordination among public agencies; insufficient planning and regulatory authority: insufficient data base and lack of information for decision-making; little understanding of

coastal ecosystems; resource decisions made primarily on the basis of economic considerations to the exclusion of ecological considerations. (Kastner-Florida)
W78-02829

THE UNITED STATES PROPOSAL FOR LEGAL REGULATION OF SEABED MINERAL EXPLOITATION BEYOND NATIONAL JURISDICTION,
J. R. Stevenson.
Natural Resources Lawyer, Vol 4, No 3, p 570-81, 1971.

Descriptors: *Regulation, *Exploitation, *Continental shelf, *International law, *Law of Sea, Political aspects, United States, Continental margin, Economics, Environment, Fishing, Manganese, Natural resources, Navigation, Oceanography, Oceans, Political constraints, Resource allocation, Jurisdiction, United Nations, Foreign countries, Exploration, Oil, Fuels.

Man has now developed the technology to exploit the mineral resources of the deep seabed. Simultaneously, a new trend of economic nationalism regarding control over ocean resources has appeared among the developing countries of the world. Because of its dependence on foreign sources for energy supplies, the United States government is attempting to replace the conflict with international cooperation by seeking to accommodate differences and reach agreements among nations in widely different geographic and economic situations. The American proposal to the United Nations Committee on the Deep Seabed would divide the oceans into two areas. The first would consist of a territorial limit for coastal states of twelve miles and beyond to the point where the high seas reach a depth of 200 meters. The remaining high seas would be regulated by an international regime. The regime would be governed by a council consisting of six industrial countries and eighteen developing nations; a majority of either group would have veto power. The complexity of the American proposal and the weighted voting structure have been criticized. Nonetheless, the United States believes it has offered an equitable solution to a complex problem. (Jordan-Florida)
W78-02830

UNITED STATES SEABED MINERALS POLICY,
N. Ely.
Natural Resources Lawyer, Vol 4, No 3, p 597-621, 1971.

Descriptors: *Law of the Sea, *Political aspects, *Continental shelf, *Resources, *Jurisdiction, International commissions, Federal government, International law, Oceans, Legal aspects, Water law, International waters, Treaties, Governments, Foreign countries, United Nations, Oil, Natural resources, Petroleum, Continental slope, Continental margin, United States, Administrative decisions, Oil industry.

In 1970 the Nixon administration proposed a new international treaty to govern the development of seabed minerals. Although the author of this article commends the treaty's goals he believes the interests of the United States are better served by the policy established by the Truman administration in 1945. That doctrine, adopted by the 1958 International Convention on the Continental Shelf, maintains that a coastal nation has exclusive jurisdiction over offshore mineral resources. It considers the continental shelf an extension of a nation's landmass, while the water above retains the status of 'high seas'. The proposed policy would create an International Seabed Area seaward of the 200-meter depth, which would include the continental margin and the deep ocean floor beyond. This area would be open to the use of all nations and controlled by an international commission. The author feels that the United States should retain the exclusive jurisdiction it possesses over the outer continental shelf, since the mineral resources there are the heritage of the American people. He maintains that the goals of international cooperation sought by the new policy could be achieved without sacrificing control of valuable mineral resources. (Malefatto-Florida)
W78-02831

HARD MINERAL DEVELOPMENT UNDER THE OUTER CONTINENTAL SHELF LANDS ACT--LEGAL AND ECONOMIC REQUIREMENTS OF THE INDUSTRY,
Covington and Burling, Washington, DC.
J. G. Laylin.
Natural Resources Lawyer, Vol 4, No 3, p 654-59, 1971.

Descriptors: *Exploration, *Mining, *Continental shelf, *Mineral industry, Coasts, Economic impact, Federal jurisdiction, Legal aspects, Foreign countries, Oceans, Offshore platforms, Economics, Compensation, State jurisdiction, Regulation, Exploitation.

Although commercial hard mineral operations are conducted off the coasts of many states from Alaska to Florida, no successful commercial hard mineral operations have been reported in the area governed by the Outer Continental Shelf Lands Act. The author suggests that this lack of activity results from the provisions of the Act and the regulations and administering practices under the Act. Consequently, changes in the Act could prove effective in developing hard mineral mining. The author recommends that prospectors not be required to disclose their discoveries and that mining licenses be easily obtained. Licenses should not be granted by competitive bidding and the only restrictions placed on offshore prospecting should be for environmental protection. As to licensing mining in areas beyond United States territorial jurisdiction, it is suggested the federal government issue licenses protecting abiding licensees from interference by nationals and other subject to the personal jurisdiction of the United States. These licenses would also be subject to multilateral treaties to protect licenses from foreign interference. The goal sought is increased offshore hard mineral mining with sure jurisdictional boundaries. (Spector-Florida)
W78-02832

MARINE RESOURCES COMMITTEE - ANNUAL REVIEW OF SIGNIFICANT ACTIVITIES - 1976,
For primary bibliographic entry see Field 5G.
W78-02833

WATER RIGHTS LAW: IS IT WORKING WELL ENOUGH,
D. Smith.
Western Water, p 3-6, July-August 1977.

Descriptors: *Water rights, *California, *Water allocation(Policy), *Planning, *Water management(Applied), Legal aspects, Water law, Prior appropriation, Riparian rights, Irrigation, Competing uses, Regulation, State jurisdiction, Water utilization, Water conservation, Water demand, Water supply, Groundwater, Water resources development, Political aspects, Equitable apportionment, Water policy, Prescriptive rights, Project post-evaluation.

Water rights law is a cornerstone of California's economy. For this reason many Californians are concerned with the work of the Governor's commission to review California water rights law. Established during California's recent drought, the commission has the responsibility for evaluating proposals for change and recommending those it deems valid. Topic areas being considered are: appropriative water rights, groundwater rights, legal aspects of water conservation, riparian rights, transferability of water rights, and instream water uses. There are those in California who feel its water rights law has not kept up with the changing needs of society and the economy. Critics point out that little has been done regarding water rights since 1913. Recent legal emphasis has centered on water quality. On the other hand, some have expressed concern about tampering with a system which has worked well. One water rights attorney has warned the commission against unnecessary change, reminding them that the state's economy depends upon the existing system, in which great sums of money have been invested. The commission's final report is due June 30, 1978. (Malefatto-Florida)
W78-02834

SEWERS, CLEAN WATER, AND PLANNED GROWTH: RESTRUCTURING THE FEDERAL POLLUTION ABATEMENT EFFORT.
For primary bibliographic entry see Field 5G.
W78-02835

UNITED TO PROTECT THE MEDITERRANEAN,
United Nations Environment Program, Geneva (Switzerland).
For primary bibliographic entry see Field 5G.
W78-02836

TOWARD BETTER USE OF COASTAL RESOURCES: COORDINATED STATE AND FEDERAL PLANNING UNDER THE COASTAL ZONE MANAGEMENT ACT,
M. Gendler.
Georgetown Law Journal, Vol 65, No 4, p 1057-78, April 1977.

Descriptors: *Resources development, *Conservation, *Governmental interrelations, *Coasts, *Project planning, Shoreline protection, Coastal engineering, Federal government, Economics, Federal jurisdiction, State governments, State jurisdiction, Inter-agency cooperation, Induced benefits, Project purposes, Multiple-purpose projects, Coordination, Oil industry.

Congress passed the Coastal Zone Management Act in 1972. Since the coastal zone is ecologically fragile, the legislation was designed for both preservation and development. Congress found state and local regulation arrangements inadequate. Therefore, the Act was designed to provide for management programs by the states with the full participation of federal agencies. Unfortunately, the desired coordination has yet to be realized. When agencies have initiated cooperative program-planning, the common result has been disagreement over individual authority. Although the Act offers economic inducements to the states, a better method might be to seek coordination and implementation of regulatory programs as the final objective. The office of Coastal Zone Management plays a supervisory role, evaluating and approving suggested state programs. Only the state of Washington has received approval and been granted funds for its program. That program uses a bilateral contact approach to state-federal coordination. The result has been misunderstandings, both in opinion and interpretation. A better approach might be to coordinate coastal resource programs through regional agencies with both state and federal involvement. Rhode Island is planning such a program at present. (Thomas-Florida)
W78-02838

AN HONORABLE DISCHARGE FOR THE BIGGEST POLLUTANT,
Fish and Wildlife Service, Washington, DC.
For primary bibliographic entry see Field 5G.
W78-02839

WATER MANAGEMENT--THE FUTURE OF FLORIDA LEGAL IMPLICATIONS,
Florida Univ., Gainesville. Inst. of Food and Agricultural Sciences.
J. S. Wershow.
Florida Bar Journal, Vol 51, No 3, p 136-46, March 1977.

Descriptors: *Water management(Applied), *Florida, *Water permits, *Legislation, *Water control, Water, Water allocation(Policy), Water conservation, Water consumption, Water distribution, Water demand, Water districts, Water pollution sources, Water quality, Water resources, Water shortage, Water supply, Water utilization, Control, Controlled drainage, Local governments, Regulation.

Florida's geography and topography and the critical importance of water in the states's growth rate pose unique problems in the control and management of available water. The degree of water resource regulation in terms of availability, use, quality, and quantity is commensurate with its importance in Florida. Regulation on the state level is characterized by overlapping responsibilities of entities reflecting different interests and purposes in the control of water. The major source of conflict lies in the growing trend to centralize authority typified by the Florida Environmental Reorganization Act of 1975 contrasted with the local regulatory scheme found in the state's 'special districts'. In addition to the soil and water conservation and drainage districts, the confusion is especially prevalent in the unclear statutory responsibility of the water management districts. This defect is exemplified by a discussion of the dual requirements of the new Act and the local management districts in the area of consumptive water use permits. Also identified are the initial responses to the conflicts by involved agencies and the need for further reform of rethinking of the problems. (Steger-Florida)
W78-02840

TENSIONS AND CONFLICTS IN FEDERAL POLLUTION CONTROL AND WATER RESOURCE POLICY,
Environmental Defense Fund, New York. Eastern Water Resources and Land Use Program.
For primary bibliographic entry see Field 5G.
W78-02841

TIME-LIMITED WATER PERMITS: LEGAL AND ECONOMIC CONSIDERATIONS,
Oklahoma City Univ., School of Law.
For primary bibliographic entry see Field 3F.
W78-02842

TIDAL TITLE AND THE BOUNDARIES OF THE BAY: THE CASE OF THE SUBMERGED 'HIGH WATER' MARK,
Fordham Univ., Bronx, N.Y. School of Law.
J. A. Humbach, and J. A. Gale.
Fordham Urban Law Journal, Vol IV, No 1, p 91-128, Fall 1975.

Descriptors: *Tidal marshes, *Adjacent landowners, *Boundary disputes, *High water mark, *Ownership of beds, Vegetation, Tidal waters, Land tenure, Public lands, Shores, Sea level, Legal aspects, Water law Surfaces, Water rights, Legislation, Public rights, Plant groupings, Boundaries(Property), Constitutional law, Adverse possession.

The line between the shore and the sea, historically called the high water line, is very indefinite, thus inviting judicial scrutiny. In 1975, a New York court of appeals addressed the issue of the location of the high water line in Dolphin Lane Associates, Ltd. v. Town of Southampton where the boundary between private uplands and nonprivately owned lands under a tidal body of water was in dispute. The court adopted a line of vegetation test with the seaward edge of growth of cordgrass, a plant that needs tidal inundation twice daily, determined to be the boundary. This line was actually part of the bay bottom and had no connection with the average high water mark. No legal theory seems squarely to support adopting this test as a rule of property. Its adoption has effected a massive expropriation of the public's property by private upland owners. This may jeopardize attemps to conserve and manage these lands as they are no longer public property, and restrictions place thereon may now constitute an unconstitutional taking. Also, this rule may thwart systemized approaches to delineate shore boundaries at the actual high water line. (Hammersley-Florida)
W78-02843

THE LIABILITY OF A SALVOR RESPONSIBLE FOR OIL POLLUTION DAMAGE,
For primary bibliographic entry see Field 5G.
W78-02844

THE RIGHT TO A 200-MILE EXCLUSIVE ECONOMIC ZONE OR A SPECIAL FISHERY ZONE,
Oslo Univ. (Norway). School of Law.
C. A. Fleischer.
San Diego Law Review, Vol 14, No 3, p 549-83, April 1977.

Descriptors: *Fishing, *International law, *Law of the Sea, *United Nations, Commercial fishing, Legal aspects, Water law, Legislation, International commissions, Oceans, Bodies of water, Conferences, Marine fisheries, International waters, Foreign waters, Treaties, Foreign countries, Governments.

The right of a country unilaterally to establish a 200-mile fishing zone seems to have a fairly firm basis. However, landlocked and geographically disadvantaged states advance the view that acceptance of an exclusive economic zone is conditional upon an agreed solution on the right of those other states to fish and that such a zone may not be invoked until an agreement on fishing rights is reached. Notwithstanding this argument, the work of the United Nations Conference on the Law of the Sea gives strong support for the contentions of several coastal States that extension of their fishing zones up to a 200-mile limit is appropriate. The obligation to accord a right to other states to fish within the zone does not in itself have such standing in state practice that this special part of the Conference's Revised Single Negotiating Text can be regarded as an expression of general law. The extent of any possible obligation must depend on wide discretion on the part of the coastal state and on the outcome of its negotiations with other states. (Hammersley-Florida)
W78-02845

FARMERS INVESTMENT COMPANY V. BETTWY: A JUDICIAL RESTRICTION OF GROUND WATER WITHDRAWALS, COERCING THE ARIZONA LEGISLATURE TO ACT,
C. K. Atkinson.
Natural Resources Journal, Vol 17, No 2, p 345-55, April 1977.

Descriptors: *Arizona, *Groundwater availability, *Water allocation(Policy), *Judicial decisions, *Percolating water, Agriculture, Arid lands, Boundries(Property), Cities, Hydrology, Water management(Applied), Water demand, Imported water, Industries, Groundwater resources, Legislation, Legal aspects, Municipal waters, Political aspects, Regional economics, Water law.

Growth in population and industry in the southwest United States has created a water crisis with municipalities consequentlty attempting to expand their water rights and import water from other areas. Adding to the problem is the fact that agricultural endeavors use ninety to ninety-five percent of the water available in the southwest. While the state legislatures of the region have failed to adopt laws restricting ground water withdrawals and setting up some order of priorities for use of this limited resource, some courts have filled the gap. One such example of judicial activism is examined in this article. The Arizona Supreme Court rendered a decison limiting the water use of all municipalities and industries to water underlying their immediate boundaries. At issue was whether the doctrine of reasonable use permitted percolating waters to be used off of lands from which they are pumped if the practice would damage the common supply of others whose lands overlie that supply. Declaring that earlier use determines the better right, the court demonstrated a growing awareness of the importance of a reasonable and consistent system of water rights administration. (Spector-Florida)
W78-02846

FEDERAL COMMON LAW REMEDIES FOR THE ABATEMENT OF WATER POLLUTION,
J. D. Kakoullis.
Fordham Urban Law Journal, Vol 5, No 3, p 549-59, Spring 1977.

Descriptors: *Federal Water Pollution Control Act, *Pollution abatement, *Common law, *Federal jurisdiction, Navigable waters, Judicial decisions, Interstate rivers, Water pollution control, Water pollution, Water law, Legal aspects, Legislation, State jurisdiction, Federal government, Discharge(Water), Constitutional law, Water quality, Water quality control.

The Supreme Court in Illinois v City of Milwaukee expressed the view that there is a federal interest in the abatement of pollution of interstate and navigable waters. When an intrastate controversy arises, the issue is not whether state law is sufficient for the resolution of such a dispute, but rather whether such disputes are of federal concern and if so, whether the federal courts must be available to complainants. The availability of federal common law remedies does not undercut a state's recognized primary role in water pollution control, but under the Illinois decision, pollution of interstate and navigable waters falls under federal law. It seems then that the effect of federal common law is to fill statutory gaps and to provide uniformity to the rules governing the interstate and navigable waters of the United States. Although even private citizens may avail themselves of the federal common law in federal courts, satisfaction of standing requirements, inherent problems in public nuisance actions, limitations on recovery of attorneys's fees, and class action requirements may all restrict the number of cases brought under federal common law. (Hammersley-Florida)
W78-02847

CANADA'S 200-MILE FISHING ZONE: THE PROBLEM OF COMPLIANCE,
British Columbia Univ., Vancouver. Inst. of International Relations.
B. Johnson, and D. Middlemiss.
Ocean Development and International Law Journal, Vol 4, No 1, p 67-110, 1977.

Descriptors: *Jurisdiction, *Canada, *International law, *International waters, *Fishing, Law of the Sea, Commercial fishing, Coasts, Aquatic productivity, Foreign waters, Marine fisheries, Oceans, United States, Foreign countries, Constraints, Induced benefits, Leases, Harbors, Costs.

On January 1, 1977, Canada implemented a unilateral 200-mile fishing zone. This step proceeded the expected approval of 200-mile zones for all coastal states by the Third Law of the Sea Conference, and consequently raised problems of obtaining and maintaining compliance by other nations. As a result, Canada has been forced to

define both its jurisdictional and its compliance goals within this zone. This article addresses the problem of compliance and examines various enforcement possibilities. The authors list options based on positive sanctions (inducement) and negative sanctions (constraint) as well as combinations of the two. Positive sanctions include granting phase-out rights, fishing leases or licenses, port privileges, and access to surplus catches. Negative sanctions include the use of force, surveillance, and diplomatic pressures. After predicting the expected costs, probabilities of success and levels of conflict for each of seven enforcement strategies, the authors recommend a mix option of positive and negative constraints consisting of a low level of force plus considerable inducements. This option offers the best probability for success with low levels of conflict and medium costs. (Spector-Florida)
W78-02848

LOG FLOTATION AS EVIDENCE OF TITLE NAVIGABILITY,
Oregon Univ., Eugene. School of Law.
C. R. Schrader.
Oregon Law Review, Vol 56, No 1, p 107-23, 1977.

Descriptors: *Oregon, *Ownership of beds, *Public rights, *Navigable waters, *Flotation, Banks, Beds, Federal jurisdiction, Surface waters, Governmental interrelations, High water mark, River beds, Navigation, Streamflow, State jurisdiction, Natural flow, Natural streams, Navigable rivers.

Basically, states are vested with ownership of the beds and banks of rivers which were navigable for title purposes at the time of statehood. However, the present extent of a state's river ownership can be greatly affected by renewed attempts to determine the title navigability of its rivers. There are three types of navigability: navigability in the title sense, navigability for commercial clause or federal jurisdiction; and navigability in the rights of public use sense. This article analyzes log flotation as evidence of title navigability in Oregon. Title navigability is a question of fact to be determined in accordance with the federal test. This test vests ownership in the state if the river was susceptible in its natural state, at the time of statehood, to profitable commercial use. Susceptibility for use, rather than actual use, is the test. The author describes the log flotation test as a useful indication of navigability but warns that it is not wholly determinative. Significantly more evidence should be presented before a trier of fact is allowed to declare the existence of navigability in the title sense. (Spector-Florida)
W78-02849

EXPANSION OF THE RESERVATION OF WATER RIGHTS DOCTRINE,
Nebraska Univ., Lincoln. School of Law.
J. Spitzenberger.
Nebraska Law Review, Vol. 56, No. 2, p. 410-21, 1977.

Descriptors: *Reservation doctrine, *Federal-state water right conflicts, *Prior appropriation, *Groundwater, Nevada, Pumping, Wells, Federal government, State jurisdiction, Water sources, Water distribution(Applied), Unappropriated water, Preferences(Water rights), Water allocation(Policy), Indian reservations, Public lands, Jurisdiction, Judicial decisions, Water rights, Water law, Legal aspects.

The reservation of water rights doctrine says that when the federal government reserves land, it also reserves enough water to accomplish its purposes. Originally the doctrine applied only to Indian reservations, but it has since been expanded to include national forests and recreation areas. In Cappaert v. United States, the government sued to prevent the Cappaerts from pumping water from wells near Devil's Hole, which is on federal land. The pumping caused a decrease in the water level in Devil's Hole threatening the survival of the pupfish. The United States Supreme Court held that when the government withdrew the land known as Devil's Hole it had reserved enough appurtenant unappropriated water to maintain the level of the pool to preserve its scientific value. For the first time, the Court set forth all the attributes of the reservation doctrine as it applies to non-Indian land, thus adding more structure to the doctrine. The Court additionally recognized the hydrological relationship between surface and groundwater holding the reservation doctrine applied to groundwater as well. However, the Court has also increased uncertainty in the area of western water rights which will require Congressional solutions. (Maass-Florida)
W78-02850

THE WATER DEPLETION DEDUCTION IN KANSAS, ITS STATUS AND PROSPECTIVE USE,
D. Elkouri.
Kansas Law Review, Vol. 25, p. 453-61, Spring 1977.

Descriptors: *Kansas, *Withdrawal, *Irrigation water, *Groundwater, *Taxes, Consumptive use, Land tenure, Water policy, Prior appropriation, Water demand, Water law, Federal government, Legislation, Farm management, Irrigation practices, Legal aspects, Water management(Applied), Water rights, Groundwater availability, Water shortage.

A tax deduction for water depletion to compensate for loss of capital when the water level beneath an individual's land declines was recognized for Texas farmers in 1965 in United States v. Shubert. This deduction has not been allowed in Kansas because the Internal Revenue Service has taken the position that the Kansas landowner does not have a sufficient ownership right in groundwater to claim a depletable interest. The author feels that the Kansas irrigation farmer should be allowed the deduction, notwithstanding the variations in the ground water law of Kansas and Texas. To claim the deduction one must prove an economic interest in the water and show that the water deposit is exhaustible. Although the Kansas farmer does not own the water deposit, he does have the exlusive right to the deposit. This has been held sufficient to establish economic interest. In addition, the Kansas farmer has the burden of proving his water supply is exhaustible. A showing that the supply is being diminished in quality or quantity such that it eventually becomes economically impracticable to extract the water will qualify it as a wasting asset. (Maass-Florida)
W78-02851

SECTION 10 OF THE RIVERS AND HARBORS ACT: JURISDICTION SHOREWARD OF THE MEAN HIGH TIDE LINE,
For primary bibliographic entry see Field 5G.
W78-02852

THE MARSHLAND ISSUE: LEGISLATIVE COMPENSATION FOR LOSSES RESULTING FROM GOVERNMENTAL LAND USE REGULATIONS – FROM INVERSE CONDEMNATION TO PRODUCTIVE USE,
B. Blinderman.
University of West Los Angeles Law Review, Vol. 9, p. 25-48, Spring 1977.

Descriptors: *Zoning, *Land use, *Compensation, *Land development, *Regulation, *Flood plain zoning, *Governments, Legislation, Penalties(Legal), Urbanization, Legal aspects, Land appraisals, Planning, Environmental control, Wetlands, Land tenure, Value, Land resources, Marshes, Eminent domain.

Land use regulation has generated much controversy over: (1) whether governmental restrictions ever impose such a burden on a landowner as to become a taking subject to an inverse condemnation action; and (2) whether the legislature should provide compensation for losses resulting from such restrictions even when not constitutionally mandated. Protection of the public and the environment requires a change in the basic philosophy behind land ownership and property rights. Property rights should be restricted to safeguard marshlands and wetlands, navigable waters, flood lands and hazardous hillsides from development and economic exploitation. Although fair standards of compensation are necessary such standards should recognize that there is no vested right to an anticipated use of land. When land use regulatons are adopted to prevent comulative damage to the environment, compensation should only be provided for losses suffered by those deprived of current, viable uses of their land rather than for those who deal in land as a commodity and claim a loss based on speculative values. (Maass-Florida)
W78-02853

FEDERAL COMMON LAW AND INTRA-STATE POLLUTION,
E. C. Pridgen.
Wake Forest Law Review, Vol. 13, No. 1, p. 246-259, Spring 1977.

Descriptors: *Federal jurisdiction, *Common law, *Water pollution control, *Law enforcement, *Pollution abatement, Water pollution, Jurisdiction, Judicial decisions, State jurisdiction, Legal aspects, Water quality control, Water quality standards, Navigable waters, Interstate waters, Bodies of water, Remedies, Water law, Standards.

Although the United States Supreme Court denied the existence of federal common law in Erie Railroad v. Tompkins, a federal common law of public nuisance to abate water pollution has since evolved. However, the Fourth Circuit Court of Appeals in Jones Falls Sewage System V. Train held that federal common law does not confer a right upon private citizens to enjoin intrastate water pollution which cannot be enjoined under the Federal Water Pollution Control Act Amendments of 1972. The court distinguished this case from the two instances where federal common law has been used: (1) the pollution of intrastate waters because neither state's law should necessarily govern; and, (2) the pollution of navigable waters when the United States complains because that is an exercise of sovereign authority to protect its proprietary rights. The author concludes that the 1972 amendments do preserve common law rights and that the courts contention that the use of federal common law cannot be sustained on the same basis as its use to abate interstate pollution ignored other justifications for applying federal common law including the need for uniformity of pollution standards. (Maass-Florida)
W78-02854

THE UNITED STATES-PERUVIAN 'FISHERIES' DISPUTE,
D. C. Loring.
Stanford Law Review, Vol. 23, No. 3, p. 391-453, February 1971.

Descriptors: *International law, *International waters, *Jurisdiction, *Fish conservation, Aquatic productivity, Coasts, Commercial fishing, Competition, Conservation, Continental shelf, Developed waters, Economic impact, Federal government, Foreign countries, Foreign waters, Governments, Marine fisheries, Pacific Ocean, South America, Law of the sea, Oceans, Political aspects, United States.

Since the early 1950's, the United States and Peru have been at odds over Peru's exercise of jurisdiction over fishing vessels within 200 miles of its

coast. Peru claims to be promoting conservation and fisheries development while acting within the scope of its sovereign powers. The United States claims the need for freedom of the seas has resulted in an International Law setting the jurisdictional limit for a coastal nation at 12 miles. The Peruvians have potlitcal, economic and psychological factors at stake in the dispute, while America's interests are mainly military and conservationists, as well as economic. This article analyzes the controversy by tracing the history and growth of the dispute, the legal arguments, the conflicting interests at stake, and governmental policies adopted to further those interests. Finally, the author suggests paths the United States could follow to reduce tension and produce a compromise solution. A hard reevaluaton of the United States' priorities followed by a bilateral legal settlement is recommended. (Spector-Florida)
W78-02855

THE CONFINED DISPOSAL PROGRAM FOR POLLUTED DREDGE SPOIL IN THE GREAT LAKES,
Eastern Michigan Univ., Ypsilanti. Dept. of Geography and Geology.
For primary bibliographic entry see Field 5G.
W78-02856

THE TAKINGS ISSUE IN A NATURAL SETTING: FLOODLINES AND THE POLICE POWER,
Tennessee Univ., Knoxville. School of Law.
For primary bibliographic entry see Field 6F.
W78-02857

WHO OWNS THE OCEANS,
Portuguese State Secretariat for Fisheries, Lisbon.
M. E. Goncalves.
UNESCO Courier, Vol 30, p 4-8, January 1977.

Descriptors: *Law of the Sea, *Water resources development, *International law, *United Nations, Exploration, Exploitation, Foreign countries, Governments, Coasts, Marine geology, Sea water, Shores, Oceans, International waters, Treaties, Natural resources, Resources development, Resources, Legal aspects, Jurisdiction.

Growing concern about the problem of protecting the sea's living resources while defending national sovereignty, particularly that of non-industrially developed nations, has led United Nations members to recognize the need for a legal framework to decide such questions. One suggestion is that the proposed International Seabed Authority would administer the exploitation of minerals in the seabed beyond the area of national jurisdiction for peaceful purposes only. Benefits would be shared equally among all members with emphasis on the needs of developing countries. A second proposal would adopt a 200-mile economic limit, thereby bringing on one third of the 'high seas' under coastal states' jurisdiction. Establishment of a New International Economic Order based on international cooperation is hampered by disputes regarding preferences given to developing countires, control of oceanographic research, payments expected for transfer of technology to developing nations, and the need for unified control standards to protect the marine environment. Final agreement will depend upon compromise and utilization of international means of settling disputes, including arbitration, the International Court of Justice at The Hague, and the new Law of the Sea Tribunal. (Mulligan-Florida)
W78-02861

ENVIRONMENTAL PROTECTION AGENCY'S VIEW OF PROJECTED OIL DRILLING ON THE CONTINENTAL SHELF,
Environmental Protection Agency, Washington, DC. International Affairs.
F. Green.
Sea Technology, Vol 17, No 10, p 10-13, 32, October 1976.

Descriptors: *Oil pollution, *Drilling, *Oil spills, *Continental shelf, Oil, Natural resources, Oily water, Oil industry, Water pollution sources, Chemical wastes, Water pollution, Oceans, Marine fish, Sea water, Coasts, Shores, Oil wastes, Water resources development, Wildlife, Transportation, Regulation, Exploitation.

Offshore oil and gas development should allow for the husbanding of the living resources of the sea and the safeguarding of onshore values such as recreational land, salt marshes, and human health. Since potential pollution from development of the Outer Continental Shelf would directly threaten the coastal zone, guidelines are offered to oil drillers to prevent ecological disasters. More research is needed before the full effects of seabed oil extraction, toxicity of petroleum compounds in the food chain, and oil leaks among marine organisms can be determined. Present Outer Continental Shelf policies are inadequate and must be reworked to include operating orders for new sites on the Atlantic Coast, Alaska, or southern California. Coordination and planning among responsible federal and state agencies must improve. Sophisticated detection equipment is recommended to track major oil spill prevention program is that regulations for transportation activities such as pipelines, railroads and trucks have not yet been formulated. Safety measures could also be bolstered by additional funding for the Coast Guard patrol and clean-up activities. (Mulligan-Florida)
W78-02862

DEPARTMENT REVIEWS DEVELOPMENTS IN INTERNATIONAL FISHERIES POLICY,
Department of State, Washington, DC. Office of Oceans and Fisheries Affairs.
R. L. Ridgway.
Department of State Bulletin, Vol 76, No 1966, p 175-78, February 28, 1977.

Descriptors: *Fish conservation, *Commercial fishing, *Jurisdiction, *Coasts, *Oceans, Aquatic animals, Aquatic environment, Aquatic production, International law, Atlantic Ocean, Pacific Ocean, Continental shelf, Economic life, Foreign waters, Fish, Fish management, Fisheries, Foreign countries, Governments, Marine fisheries, Seashores.

The United States is both a coastal fishing nation and a distant-water fishing nation. Foreigners fish our waters extensively and our fishermen frequent the coastal waters of other nations. The presence of large mechanized foreign fleets off our coasts has become commonplace since the 1950's, sparking protest from American fishermen. The Fishery Conservation and Management Act was passed in 1976 to protect our resources and preserve the livelihood of our fishermen. The federal government sought to strike a balance by giving the United States control over its coastal stocks, and providing for conservation and management of its fisheries resources while protecting the interests of its distant-water fishermen. The Act mandated negotiations with foreign nations to set out principles and procedures by which they may fish in United States waters. It also sought recognition of a 200-mile fisheries conservation zone off the United States coasts. This article lists nations which have signed the governing fishery agreements and those with whom negotiations are underway. The author discusses problems such as time lags between signing agreements and obtaining valid permits aboard foreign vessels. She offers suggestions to expedite the transitional process. (Spector-Florida)
W78-02863

DEPARTMENT DISCUSSES INTERNATIONAL APPROACHES TO PROBLEM OF OIL SPILLS FROM VESSELS,
Law of the Sea Conference, New York.
T. V. Learson.
Department of State Bulletin, Vol 76, No 1963, p 113-16, February 7, 1977.

Descriptors: *International law, Ships, *Oil spills, *Regulation, *Treaties, Water law, Oceans, Legal aspects, Governments, Law enforcement, Foreign waters, Harbors, Law of the Sea, Water pollution, Water pollution sources, Political aspects, International waters, Oil wastes.

Under international law, the degree of prevention and enforcement powers which the United States possess with regard to the vessel-pollution problem is determined by the location of the vessel. There are three zones of influence. In internal waters, including ports, a coastal nation may legislate and enforce pollution regulations without restriction. In territorial waters, a coastal-state has sovereignty to regulate subject to the right of vessels to innocent passage. Outside territorial waters a coastal-state may take necessary action to prevent grave and imminent danger. In addition to the rights of coastal states to regulate against vessel pollution, flag states are obligated to police vessels under their jurisdiction. Current Law of the Sea negotiations urge increased obligations on flag states and increased powers of enforcement for coastal-states and states with vessels in port. The current Administration wants to increase the powers of port-states to maintain freedom of the seas in the 200 mile economic zone and to allow port states to prosecute vessels for violations of international laws. The issue of liability for damage caused by oil spills is also discussed. (Curran-Florida)
W78-02864

HOW PEOPLE WHO REMEMBER CLEAN WATER ARE USING NEW LAWS TO BRING IT BACK,
National Wildlife, Vol 15, p 26-27, December 1976.
O. A. Houck.
National Wildlife, Vol 15, p 26-27, December 1976.

Descriptors: *Wildlife conservation, *Wetlands, *Drainage effects, *Legislation, *Water pollution control, Wildlife, Wildlife management, Habitat improvement, Marsh management, Land development, Swamps, Drainage practices, Land reclamation, Fish management, Fish conservation, Wildlife habitats, Environmental effects, Balance of nature, Federal Water Pollution Control Act, Aquatic habitats, Natural resources, Water quality, Water quality control.

Legislation is now available to aid citizens in resisting wetland development injurious to wildlife. The National Environmental Policy Act requires resource decisions to be open to public scrutiny and that the environmental impact be considered. The Fish and Wildlife Coordination Act demands that federal projects destroying wetlands provide replacement habitat. The 1972 Water Pollution Control Act covers chemical and sewage discharges, requiring a permit meeting state and federal standards for each discharge. Section 404 mandates notice in advance, criteria, and an opportunity for public hearings, and gives the permit responsibility to a former offender, the Corps of Engineers. Other destroyers of wetlands include the small watershed program of the Soil Conservation Service and the federal highway programs. The latter drains wetlands for highways and large interchanges. Section 4(f) of the Department of Transportation Act can help control such development by its prohibition of roads through refuges, parks, and recreation areas unless no feasible alternative exists. It is possible for concerned citizens to take a more assertive approach against offenders by utilizing available laws to their fullest. (Mulligan-Florida)
W78-02865

UNDERSEA RESOURCE AT STAKE AT U.N. CONFERENCE,
P. Lewis.

National Journal, Vol 8, No 9, p 249-54, February 28, 1976. 1 tad.

Descriptors: *Mineral industry, *Law of the Sea, *International law, *Negotiations, *Commercial fishing, United Nations, Oceans, Mining, Continental shelf, Navigation, International waters, Marine fish, Marine geology, Treaties, Water pollution, Resources development, Ships, Economics, Oil industry, Metals, Water law, Ownership of beds.

Because of the world's increasing use of the sea, existing international law has become outmoded. The third United Nations Conference on the Law of the Sea has attempted to draw up a new international treaty governing ownership and conservation of sea resources and restricting marine pollution. Conflicts between maritime powers and developing nations has prevented significant progress. Industrialized coastal nations wanted a 200-mile economic zone to tap seabed mineral resources. Developing nations and landlocked countries wanted deep-sea mining internationalized. Suppliers of minerals feared economic instability from new mining sources. The 200-mile limit for fishing also divided landlocked nations from those with lengthy coastlines. The Conference focused control of marine pollution on vessel-source pollution threatening those nations with outdated merchant fleets. Although fishing and pollution compromises appear likely, the author stresses seabed mining as the major problem area. Because the rich, technological countries, especially the United States, will be the primary beneficiaries, a serious wealthy/poor nation division will continue. Instead of creating a genuinely international code of law for the profit of all, the Conference appears to have sanctioned a massive carve-up of continental shelf riches. (Cocheu-Florida)
W78-02866

IMPLEMENTING THE DRINKING WATER ACT--A NEW APPROACH FOR EPA,
For primary bibliographic entry see Field 5G.
W78-02869

TOWARD REGIONAL ARRANGEMENTS FOR REGULATION OF MARINE POLLUTION: AN APPRAISAL OF OPTIONS,
Nairobi Univ. (Kenya). Inst. for Development Studies.
For primary bibliographic entry see Field 5G.
W78-02870

MEXICO'S UNILATERAL CLAIM TO A 200-MILE EXCLUSIVE ECONOMIC ZONE: ITS INTERNATIONAL SIGNIFICANCE,
Universidad Nacional Autonoma de Mexico, Mexico City.
A. Szekely.
Ocean Development and International Law Journal, Vol. 4, No. 2, p. 195-211, 1977.

Descriptors: *Mexico, *Law of the Sea Conference, *International commissions, *International law, Law of the sea, Fishing, Jurisdiction, Foreigh waters, Continental shelf, Legal aspects, Oceans, Negotiations, International waters, Treaties, Conferences, Commercial fishing.

The purpose of this work is twofold. First, to analyze the general significance, from an international point of view, of the unilateral establishment by Mexico of its 200-mile Exclusive Economic Zone, within the framework of, respectively, the present standing of the emerging rules of the new land of the sea, and the stage at which the Third United Nations Conference on the law of the sea finds itself after four seasons of negotiations. The arguments resorted to by Mexico in order to defend the legality and opportunity of its claim of establishment of the Exclusive Economic Zone is contrary to Mexico's traditional law of the sea practice, the practice consisting of a permanent policy by Mexico, throughout its independent life, of waiting for international agreements to be concluded, or for international customs to be definitely shaped, before proceeding to the unilateral delimitation of its marine zones. (Curran-Florida)
W78-02871

WETLANDS LEGISLATION IN NEW HAMPSHIRE,
M. B. Stusse.
New Hampshire Bar Journal, Vol 18, No 4, p 265-80, June 1977.

Descriptors: *New Hampshire, *Wetlands, *Legislation, *Dredging, Landfills, Legal aspects, Administration, Regulation, Water law, Freshwater marshes, Salt marshes, Tidal marshes, Drainage effects, Constitutional law, Penalties(Legal), Permits, Zoning, Swamps, Local governments, Drainage, Water pollution.

The failure to understand the value of wetlands has led to the dredging, filling and destruction of wetland resources. In the past, this misconception has resulted in such legislation as New Hampshire's Improvements of Swamp Lands Act which encourages townships to dredge and fill wetlands. This article examines five New Hampshire statutes which could theoretically apply to wetlands. Also examined are the sometimes conflicting penalties imposed for violation of the wetlands laws. The author suggests future legislation which could accurately reflect the value of wetlands. The existing New Hampshire laws affecting wetlands, which are considered in the article, deal with the placing of fill in both public waters and tidal waters, the excavating or dredging of land under public waters, and water pollution. Also discussed are the effects of local and federal regulation of wetland areas. The author recommends that New Hampshire enact a specific and comprehensive wetlands alteration law which insures due process, defines the land affected, identifies the purpose for which wetlands can be protected, provides for local control, minimizes the burden placed on the regulating body, and establishes uniform enforcement and penalties. (Curran-Florida)
W78-02872

THE FEDERAL WATER POLLUTION CONTROL ACT AND FORESTRY,
National Forest Products Association, Washington, DC. Environmental Quality Dept.
For primary bibliographic entry see Field 5G.
W78-02873

SAVING THE GREAT LAKES,
Maclaren (James F.) Ltd., Willowdale (Ontario).
For primary bibliographic entry see Field 5G.
W78-02875

BUILDING A BETTER SMALL WATERSHED PROGRAM,
For primary bibliographic entry see Field 4D.
W78-02876

TIDELANDS SEAWARD OF PUBLIC RECREATIONAL SITES; PERMITS; NOTICES.
Alas. Stat. secs 38.05.330, 38.05.345(d), (Supp. 1976).

Descriptors: *Alaska, *Recreation facilities, *Permits, *Land use, Land, Fisheries, Leases, Bodies of water, Ditches, State governments, Priorities, Easements, Right-of-way, Intertidal areas, Pipelines, Roads, Transmission lines.

The state of Alaska has enacted legislation that allows a municipality which accepts a public recreation facility from the state to apply for and receive by conveyance all state-owned land seaward of the facility between the mean high and low tide lines. Regulations may be promulgated providing for such conveyance. Certain interests relating to shore fisheries development and mineral exploration obtained before August 13, 1974, are affected by this legislation only on the date of their expiration or termination. Permits, rights of way or easements on state lands may be granted certain enumerated uses such as roads, pipelines, transmission lines and mineral production facilities. Uses of greatest economic benefit to the state will be preferred with first preference given to upland owner for the use of tideland and contiguous submerged land, seaward of the upland owner's property and needed for any permitted use. Public notice of the disposal of any interest in land adjacent to a body of water or waterway must state that a determination as to whether the water is navigable or public is to be made if it has not been previously determined. (Smith-Florida)
W78-02911

TANK VESSEL TRAFFIC REGULATION ACT.
Alas. Stat. secs 30.20.010 thru 30.20.070 (Supp. 1976).

Descriptors: *Oil pollution, *Oil spills, *Legislation, *Safety, *Alaska, Hazards, Oily water, Natural gas, Water pollution, Accidents, Wastes, Equipment, Fish conservation, Regulation, Water pollution effects, Shore protection, Law enforcement, Penalties(Legal), Natural gas, Transportation, Ships, Water pollution sources.

The legislature of Alaska was prompted by the state's irregular shoreline and its susceptibility to long-term damage from large oi discharges to pass the Tank Vessel Traffic Regulation Act in 1976. Thus, tankers and other carriers of crude oil, refined petroleum products or their by-products are required to have specific safety and maneuverability equipment or be escorted by tugs while in waters of the state. Such items as navigational systems, collision avoidance systems, and radar devices are mandatory. The Act also establishes authority in the Department of Environmental Conservation to enforce traffic regulations. Traffic regulatons shall be established, adopted, maintained, and administered with the consultation and cooperation of the United States Coast Guard. Violators of the Act's provisions, or of regulations adopted under its authority, are subject to fines ranging from $1,000 to $25,000 and/or a maximum prison term of one year upon conviction. Each day on which a violaton occurs may be considered a separate and additional offense. The governor may, upon approval by the state legislature or the United States Congress, enter into agreements with any other state or foreign government to implement the purposes of the Act. (thomas-Florida)
W78-02912

ABANDONED MINE DRAINAGE CONTROL ACT.
Md. Code Ann, sec 7-604 (1974), as amended, (Supp. 1976).

Descriptors: *Drainage programs, *Legislation, *Maryland, *Mining, *Pollution abatement, Loans, Financing, Land reclamation, Mine drainage, Government supports, Drainage effects, Land development, Conservation, Land use, Mine wastes, Economics, Strip mines, Land tenure, Cost repayment, Water pollution sources, Coal mine wastes, Water quality.

The state of Maryland has enacted legislation requiring that all proceeds from the state's Mine Reclamation and Water Quality Restoration Loan of 1970 be expended exclusively to finance the costs of acquisition, reconstruction, extension, and improvement of facilities in connection with the prevention, control, and abatement of pollution of the waters of the state from abandoned

deep or strip mines, including the prevention of drainage. However, the proceeds are not to be used to improve, rehabilitate or prevent drainage on any land not owned by the state or its political subdivisions unless the actual owner of the land contributes toward the cost of such improvements. After land has been improved through any of the above means, it may be sold, retained by the state, or transferred to a political subdivision. The state may accept gifts of land from private persons to accomplish the purposes of the Act. After improvement, such land is also subject to transfer. All proceeds from the sale of land acquired under this section are to be deposited in the 'Abandoned Mine Drainage Capital Fund'. (Thomas-Florida)
W78-02913

SURFACE MINING.
Md. Code Ann. secs 7-6A01 thru 7-6A31 (1974), as amended, (Supp 1976).

Descriptors: *Mining, *Permits, *Legislation, *Maryland, *Reclamation, Industrial wastes, Mine wastes, Waste disposal, Aquatic habitats, Balance of nature, Environmental effects, Fisheries, Wildlife, Planning, Land reclamation, Soil conservation, Economic justification, Stripmines, Regulation, Inspection.

The state of Maryland has enacted legislation to regulate surface mining. The legislature recognized that surface mining is vital to the economic well-being of the state but also realized the need to protect the health of its citizens from the harmful results of the mining. A permit system for surface mining is established with the Department of Natural Resources having the authority to grant, deny, and revoke mining permits. Permit applications may be denied if the proposed mining will constitute a danger to natural conditions or to human activities in a neighboring area. Permits are granted for any reasonable time not exceeding twenty-five years. Applications must be filed for permit modifications. Permit renewal is subject to the same procedures and standards as the initial permit application. Permits may be transferred, leased, or assigned with approval of the Department. A permit applicant must submit a mining and reclamation plan. Holders of permits must file an annual mining and reclamation progress reort and are subject to periodic inspections. The Department must make a final inspection when reclamation has be completed. If reclamation is satisfactory, the operator's performance bond will be released. (Thomas-Florida)
W78-02914

ALASKA OIL DISCHARGE PREVENTION AND POLLUTION CONTROL ACT (GENERAL AND MISCELLANEOUS PROVISIONS).
Alas. Stat. secs 30.25.290 thru 30.25.360 (Supp. 1976).

Descriptors: *Alaska, *Oil pollution, *Legislation, *Water pollution control, Environmental control, Oil spills, Interstate compacts, Discharge(Water), Facilities, Ships, Regulation, Administrative agencies, Cities, Navigable waters, Transportation.

Article Seven of the Alaska Oil Discharge Prevention and Pollution Control Act of 1976 contains general and miscellaneous provisions. One section grants the governor power to execute supplementary agreements, reciprocal arrangements, or compacts with other states or foreign governments. There is a provision requiring an annual report to the governor and the legislative from the Department of Environmental Conservation. Another section provides that the terms of this act or regulations of the department prevail over municipal ordinances and regulations. The Administrative Procedure Act is deemed inapplicable to the proceedings of the department under the Pollution Control Act subject to enumerated exceptions. The state is not liable for any act or omission arising out of the enforcement or implementation of the act. Also included are the definitions of the following terms: barrel; board; carrier; commissioner; deadweight tonnage; department; discharge; fund; municipality; crude oil; oil terminal facility; operate; transferred; tank vessel; and, waters of the state. (Howard-Florida)
W78-02915

OIL TERMINAL FACILITIES: TRANSFER OF CRUDE OIL, REFINED PETROLEUM PRODUCTS OR THEIR BY-PRODUCTS.
Alas. Stat. secs 30.25.010 thru 30.25.210 (Supp. 1976).

Descriptors: *Alaska, *Oil industry, *Oil spills, *Oil pollution, *Water pollution control, Compensation, Storage, Transportation, Inspection, Offshore platforms, Water pollution effects, Water pollution treatment, Environmental control, Oil wells, State governments, Seashores, Estuarine environment, Risks, Penalties(Legal), Coasts, Beaches.

The Alaska legislature has recognized the need to protect coastal and inside coastal waters and beaches from the spills, discharges and escapes of crude oil or refined petroleum that may occur as a result of procedures involved in the transfer and storage of these products. The statutes seek to exercise the police power of the state through the Department of Environmental Conservation to deal with the hazards posed by these transfers by requiring prompt removal of oil spills, compensation where damage occurs, and inspection and supervision of oil transfer activities. A provision is made for establishing a system of regulation by requiring the possession of a certificate of risk avoidance, payment of risk charges and proof of financial responsibility by owners or operators of oil terminal facilities. The statutes allow exemptions for some business from the proof of financial responsibility and certificate of risk avoidance requirements, and grant the governor emergency proclamation powers when a disaster arising from the discharge of oil products appears imminent. Criminal and civil sanctions are established for violations of the statutes. (Howard-Florida)
W78-02916

ALASKA LAND ACT (DEFINITIONS OF NAVIGABLE WATERS AND PUBLIC WATERS).
Alas. Stat. sec 38.05.365 (Supp. 1976).

Descriptors: *Alaska, *Navigable waters, *Inland waterways, *Legislation, Rivers, Streams, Lakes, Ponds, Bays, Estuaries, Straits, Oceans, Sounds, Inlets(Waterways), Canals, Lumbering, Public benefits, Recreation, Fish migration, Wildlife habitats, Aquatic habitats.

For the purposes of the Alaska Land Act navigable water are defined as 'any water of the state forming a river, stream, lake, pond, slough, creek, bay, sound, estuary, inlet, strait, passage, canal, sea or ocean, or any other body of water or waterway within the territorial limits of thestate or subject to its jurisdiction, that is navigable in fact for any useful public purpose, including but not limited to water suitable for commercial navigation, floating of logs, landing and takeoff of aircraft, and public boating, trapping, hunting waterfowl and aquatic animals, fishing or other public recreational purposes'. Public waters are defined as 'navigable water and all other water, whether inland or coastal, fresh or salt, that is reasonably suitable for public use and utility, habitat for fish and wildlife in which there is a public interest, or migration and spawning of fish in which there is a public interest'. (Curran-Florida)
W78-02917

LIMITATION ON OIL AND GAS LEASES IN CERTAIN AREAS, AND REACQUISITION OF LEASES.
Alas. Stat. secs 38.05.184 (Supp. 1976).

Descriptors: *Alaska, *Bays, *Oil pollution, *Leases, *Natural resources, Oil drilling, Drilling, Oil, Currents(Water), Natural gas, Crabs, Shellfish, Water law, Commercial shellfish, Water pollution, Commercial fishing, Fish, Marine fisheries, Water pollution effects, Negotiations, Eminent domain.

The Alaskan legislature found that oil and gas development in the Kachemak Bay presents an undue hazard to commercial fisheries and decided to limit future leasing in the bay area. Recent information disclosed that even minute quantities of oil released into the marine environment may be harmful to the larval forms of crabs and other marine life and that the existence of gyral currents within the bay may increase the likelihood of oil coming into contact with these valuable commercial fish and shellfish. Because of these findings no additional oil and gas leases are to be issued for the exploration for, or the development or production of, oil and gas on state-owned land in the bay area. The state is to enter into negotiations to reacquire by purchase or credit offsets outstanding interests in oil and gas leases in the prescribed area. For a period of one year there are to be no drilling activities in the bay area. During this moratorium, the state is to develop plans to protect the marine resources. Any leases not acquired during the moratorium period may be the subject of eminent domain proceedings. (Curran-Florida)
W78-02918

COASTAL PROTECTION FUND.
Alas. Stat. secs 30.25.220 thru 30.25.280 (Supp. 1976).

Descriptors: *Alaska, *Risks, *Protection, *Oil spills, *Coasts, Estimating, Oil, Research and development, Legal aspects, Penalties(Legal), Oil pollution, Oil spills, Docks, Management, Costs, Safety, Legislation, Shore protection.

The state of Alaska has enacted legislation creating a coastal protection fund. This fund is established as a revolving fund whose proceeds are to be used to carry out the purpose of the act by the appropriate department. The fund is to be supplied and maintained from annual risk charges to carriers and terminals covered by the act. The amount of the risk charge required of a carrier transporting crude or refined petroleum products will be determined by the presence of safety or maneuvering capabilities and if the vessel is 40,000 deadweight tons or more by the presence of gas inerting systems, the capacity of segregated ballast tanks and prior risk experience. Money in the fund may be disbursed for administrative expenses; for all cost involved in the abatement, containment or removal of pollution related to the discharge of oil products; and for research and development. If excess disbursements occur, the fund will be maintained by pro rata charges to carries and terminals covered by the act. Oil terminals facilities and carriers are held strictly liable for all violations. (Curran-Florida)
W78-02919

CIVIL ACTION FOR POLLUTION; DAMAGES; INJUNCTIONS; CRIMINAL PENALTIES.
Alas. Stat. secs 46.03.760 thru 46.03.790 (Supp. 1976).

Descriptors: *Alaska, *Penalties(Legal), *Assessments, *Legislation, Permits, Water law, Regulation, Administration, Law enforcement, Civil law, Damages, Abatement, Control, Water pollution, Costs, Investigation, Pollution abatement.

The state of Alaska has established fines for persons who violate Alaska's water conservation laws, administrative orders or conditions for a permit. The sums assessed under this statute are not to be used for punitive purposes but are to include the reasonable compensation for any adverse en-

vironmental effects caused by the violation, the cost incurred by the state in detection, investigation and correctig the violation and the economic savings realized by the person in not complying with the requirements for which a violation is charged. The superior court can grant an injunction to enjoin a violaton without a showing of physical irreparable harm. A person who violates the water conservation law, administrative orders or conditions for a permit may also be charged with a criminal misdemeanor punishable by a fine. A person who willfully violates these laws may be imprisoned in addition to a fine. (Curran-Florida)
W78-02920

MONROE CONTRACTORS EQUIPMENT, INCORPORATED V. STATE (LIABILITY IN DIVERTING WATER COURSES).
395 N.Y.S 2d 829-31 (App. Div. 1977).

Descriptors: *New York, *Flood damage, *Culverts, *Road construction, *Negligence, Water, Water level, Elevation, Surfaces, Overflow, Flow, Floods, Legal aspects, Water law, Water flow, Surface water, Runoff, Channels, Pipes, Highway effects, Highways, Roads.

Claimant landowner successfully mantained a suit against the state for damages caused by flooding of the claimant's land which adjoined state property. Prior to state acquisition of the property, a natural ditch ran across the property and along a road bordering the claimant's land. At some previous time, a pipe had been laid under the road. Although the pipe had gradually filled with silt and no longer carried water away from the claimant's land, there had been no flooding of the land before the state constructed a highway adjacent to it. The state contended that it was not liable because it merely changed the elevation of the land and that only surface water flowed onto claimant's property. The state did admit: (1) observing the ditch and the moving water before starting construction; and (2) not making a careful search for the source of the water. The Appellate Division of the New York Supreme Court held that the state negligent in blocking the long-existing water course passing through a culvert near claimant's property and liable for the resulting flood damage. (McPherson-Florida)
W78-02921

COX V. CAMBRIDGE SQUARE TOWNE HOUSES, INC.
236 S.E.2d 73-75 (Ga. 1977).

Descriptors: *Damages, *Georgia, *Sewers, *Storm drains, *Drainage systems, Erosion, Storms, Streams, Storm runoff, Surface waters, Drainage, Surface drainage, Bank erosion, Rainfall intensity, Legal aspects, Judicial decisions, Water law, Trespass.

Appellant landowner brought suit against appellee apartment complex owner claiming that the installation of a storm drain system by the appelle greatly increased the flow of surface waters across the appellant's land. The appellant contended that because of the sewer system, whenever heavy rains fall, great quantities of water were emptied into a creek running through appellant's backyard, thus causing erosion of the banks of the creek and slowly washing away the appellant's property. The appellant sought both actual and punitive damages and a permanent injunction. The appellee moved to dismiss the suit claiming that it was barred by the four-year statute of limitation of realty. The Supreme Court of Georiga, in reversing the lower court's dismissal, adopted the approach used by the Restatement of Torts in dealing with continuing nuisances. Under this rule the appellant has the right to elect to treat the nuisance as temporary and sue for all damages which have occurred within the last four years or he may elect to sue for all future damages as well. The statute of limitations only precludes recovery for damages suffered more than four years before the suit was filed. (Petruff-Florida)
W78-02922

PPG INDUSTRIES, INCORPORATED V. ENVIRONMENTAL PROTECTION AGENCY.
365 N.E.2d 1325-29 (Ill. Ct. App. 1977).

Descriptors: *Illinois, *Suspended solids, Effluents, *Cooling water, *Permits, Regulation, Ponds, Water pollution, Water pollution sources, Treatment, Industrial wastes, Industrial water, Solid wastes, Discharge(Water), Storm runoff, Judicial decisions, Legal aspects, Water law, Standards.

Appellant glass manufacturer sought review of the denial of its petition for a variance from a suspended solids requirement by the Illinois Pollution Control Board. The variance was sought for a cooling pond constructed by appellant on its property. No natural watercourses enter the pond, but it does have an outlet into state waters. The appellant obtained a permit from the Environmental Protection Agency (EPA) which authorized discharge into the pond. However, the permit was subject to certain conditions including a limit on the concentration of suspended solids. Upon testing, the EPA discovered that the concentration of solids fluctuated and often exceeded this standard. Although the parties agreed that the excessive concentration of solids was attributable to the effects of storm runoff, animal action, and fish action in stirring up the sediment in the pond, the Board refused to grant the appellant a variance. In upholding the denial of the variance, the court found that since the appellant was solely responsible for the presence of the pond, it was not unreasonable to hold it responsible for the quality of the water leaving the pond and entering state waters. (Petruff-Florida)
W78-02923

SKEEN V. TEXAS (INVERSE CONDEMNATION ACTION FOR FLOOD DAMAGE FROM INADEQUATELY DRAINED STATE HIGHWAY).
550 S.W.2d 713-16 (Tex. Civ. App. 1977).

Descriptors: *Texas, *Eminent domain, *Runoff, *Flood damage, *Damages, Water, Elevation, Overflow, Routing, Judicial decisions, Real property, Value, Flood waters, Water levels, Property values, Constitutional law, Highways, Environmental effects, Highway effects, Drainage, Drainage effects, Legal aspects.

Plaintiff property owner brought an inverse condemnation action for water damage to her property caused by the water runoff from an elevated highway. The defendant state and State Highway Department filed for and received a judgment on the jury verdict based upon the jury finding that the construction of the home in a low area was a producing cause of the property damage. The Court of Civil Appeals of Texas reversed and entered judgment for the plaintiff for damages under the Texas Constitution which provides that 'no person's property shall be taken, damaged or destroyed for or applied to public use without compensation'. The court found that the damage complaned of was for a public use. In addition, the jury found the the elevation of the highway caused the overflow of water and injured the plaintiff's real and personal property. Therefore, under the State Constitution the plaintiff was entitled to damages for inverse condemnation. The court said that the location of the plaintiff's home in a lowlying area was immaterial to the question of inverse condemnation. (Kastner-Florida)
W78-02924

PLAISANCE V. UNITED STATES (FEDERAL INCOME TAX LIABILITY ON THE HIGH SEAS).
433 F. Supp. 936-39 (E.D. La. 1977).

Descriptors: *Taxes, *International waters, *United States, *Continental Shelf, *Jurisdiction, Federal government, Governments, Governmental interrelations, Foreign countries, Income, Natural resources, Exploration, Exploitation, Government finance, Tax rates, International law, Oceans, Political aspects, Law of the Sea, United Nations, Boats, Ships.

The plaintiff, a United States citizen domiciled in Louisiana, worked as a tugboat captain during the years 1967 an 1968. Within that two-year period he spent at least 510 full days of a consecutive eighteen-month period either on the tug in the North Sea or in a contiguous country. In his income tax returns, the plaintiff claimed to be within a foreign country' and therefore entitled to an exclusionary income tax provision. The plaintiff received deficiency notices from the Internal Revenue Service for the years 1968 and 1969. He paid the alleged deficiencies and is now seeking a refund for the amount paid in 1968. In finding that the plaintiff was not within the jurisdiction of a foreign country, the court relied on the Convention on the Continental Shelf adopted by the Law of the Sea Conference. This convention defines the continental shelf and grants coastal states sovereign rights over the shelf for purposes of mineral exploration and exploitation. The convention makes it clear, however, that the high seas are not under the dominion of any single nation. Accordingly, the court rejected the plaintiff's claim for a tax refund. (Steger-Florida)
W78-02925

UNITED STATES V. CALIFORNIA (FEDERAL COMPLIANCE WITH STATE PERMIT REQUIREMENT).
558 F2d 1347-54 (9th Cir 1977).

Descriptors: *Water permits, *Governmental interrelations, *Unappropriated water, *Federal reclamation law, *Legal aspectsm, Permits, Governments, State governments, State jurisdiction, Federal jurisdiction, Water rights, California, Appropriation, Water law, Legislation, Reclamation, Prior appropriation, Judicial decisions, Priorities, Administrative agencies.

The plaintiff federal government sought a declaratory judgment that the United States could appropriate unappropriated water for use in a federal reclamation project in California without applying for a state permit. The state contended that Section 8 of the 1902 Reclamation Act required the plaintiff to apply to the state board for such a permit. When the Act was adopted, California did not require permits. The Ninth Circuit Court of Appeals found that reading the act as requiring compliance with laws that did not then exist would be contrary to prior court decisions. Such compliance could only be required where the language of the Act was more specific. On petition for rehearing the state explained that two applications in this case were filed by a state agency and assigned to the plaintiff. The state contended that since the agency would have been bound by the state's conditions, plaintiff assignee should similarly have been bound. The court held that the plaintiff, as assignee of an applicant, is no more subject to the imposition of conditions by the state than it is as an original applicant. (Beamer-Florida)
W78-02926

MOORE V. HAMPTON ROADS SANITATION DISTRICT (OYSTER BED DAMAGE FROM SEWAGE DISCHARGE NOT WITHIN FEDERAL ADMIRALTY JURISDICTION).
557 F.2d 1030-39 (4th Cir. 1977).

Descriptors: *Sewage disposal, *Oysters, *Tidal waters, *Damages, *Jurisdiction, Virginia, Sewage, Wastes, Sewage treatment, Water pollution, Water pollution sources, Tidal streams, Shellfish farming, Commercial shellfish, Coliforms, Sewage bacteria, Water quality,

Ownership of beds, River, Cities, Local governments.

Plaintiff lessees of oyster beds brought an action against the city and the sanitation commission alleging that their oyster beds had been destroyed as the result of the improper operation of a sewage disposal system by the city and the commission. The plaintiffs alleged negligence, nuisance and taking of their property without just compensation against the city and unjust taking against the commission. The commission had operated sewage treatment plants in the area before and during the time of the leases. They contended the oystermen took their leases subject to the risk of closure due to lawful discharges. The city claimed governmental immunity. The district court directed a verdict in favor of the commission and granted the city's motion for judgment not withstanding the verdict. The United States Fourth Circuit Court of Appeals originally affirmed the judgment for the commission and reversed for the city. On rehearing the court affirmed for both holding that damage to the leaseholds from sewage discharges was not related to the maritime aspects of the oystering industry and therefore not within the admiralty jurisdiction of the federal courts. (Beamer-Florida)
W78-02927

PUGET SOUND POWER AND LIGHT CO. V. F.P.C. (LICENSING JURISDICTION OVER REPAIRS TO HYDROELECTRIC PROJECT).
557 F.2d 1311-16 (9th Cir. 1977).

Descriptors: *Federal jurisdiction, *Federal power act, *Hydroelectric plants, *Hydroelectric project licensing, *Repairing, Construction, Dam construction, Diversion dams, Electric generators, Electric power, Electric power industry, Electric power production, Electric power plants, Generators, Hydroelectric power, Jurisdiction, Legislation, Non-navigable waters, Power system operation, Projects, Regulation, Rivers, Judicial decisions.

Petitioner, electric power company, sought a determination that respondent, Federal Power Commission, had no licensing jurisdiction over a hydroelectric project originally built in 1904 on a non-navigable stream. The project had undergone extensive repair and restoration following a landslide in 1936. The Commission contended that such repairs were sufficient to bring the project within its jurisdiction under the provisions of the 1935 amendments to the Federal Power Act. Those amendments required parties intending to construct dams or other projects on non-navigable streams to file a license application with the Commission. The Ninth Circuit Court of Appeals held that the mandatory licensing requirements of the Federal Power Act were not to be applied retroactively. Furthermore, the court held that the repair work undertaken by the petitioner did not constitute construction within the meaning of the 1935 amendments. Although the repairs involved were substantial, they merely restored the project to its original specifications with no changes in capacity or physical plants. (White-Florida)
W78-02928

HOMEOWNERS, EMERGENCY LIFE PROTECTION COMMITTEE V. LYNN (ADEQUACY OF ENVIRONMENTAL IMPACT STATEMENT FOR DAM PROJECT).
432 F. Supp. 1334-38 (C.D. Cal. 1977).

Descriptors: *California, *Reservoir construction, *Environmental control, *Dam construction, Judicial decisions, Government, Federal government, Local governments, Environment, Dams, Environmental effects, Legislation, Legal aspects, Flow control, Water storage, Water utilization, Water supply, Water supply development, Reservoirs.

Plaintiff environmental committee brought action for declaratory and injunctive relief to prohibit defendant city and federal government from acting on a proposed Los Angeles dam and reservoir. The plaintiff contended that the National Environmental Policy Act of 1969 requires filing of an Environmental Impact Statement prior to commencement of construction. The defendants maintained that the project was under control of the city and not the federal government. Subsequent to filing of this action the project received federal funding and the city was enjoined by the Ninth Circuit Court of Appeals from further action relating to funding of the project. The Court of Appeals remanded to the district court to determine: (1) whether further construction should be enjoined pending determination of the adequacy of the Environmental Impact Statement; and, (2) whether the statement was adequate. The court held that the proposals set forth were sufficient to permit a reasoned choice of alternatives to the project and therefore the Environmental Impact Statement was adequate. Since the plaintiff failed to pursue the action and had stipulated prior to judgment that injunction was not sought, the complaint was dismissed. (Mulligan-Florida)
W78-02929

AMERICAN ASSOCIATION OF MEAT PROCESSORS V. COSTLE (STATUE OF LIMITATIONS FOR REVIEW OF EFFLUENT GUIDELINES).
556 F.2d 875-77 (8th Cir. 1977).

Descriptors: *Legal review, *Effluents, *Regulation, *Waste water(Pollution), Judicial decision, Wastes, Water pollution, Water law, Legal aspects, Equity, Water pollution sources, Discharge water, Sewage effluents, Waste water disposal, Administrative decisions, Food processing industry, Standards.

Plaintiff meat processors sought judicial review of the point source effluent guidelines for meat products promulgated by the Environmental Protection Agency (EPA) pursuant to the Federal Water Pollution Control Act Amendments of 1972 (FWPCAA). The EPA contended that review should not be granted because the plaintiff's application for review was untimely. The FWPCAA permits judicial review within ninety days after guidelines are promulgated, but limits review after such time to applications based on grounds which arose after the nineteenth day. The plaintiffs admitted their application was after the deadline but argued that the time limit should be extended because of the uncertainty that existed as to which court was the proper forum to seek review of the guidelines. The court of appeals acknowledged the existence of uncertainty but dismissed the plaintiffs' application for review. The court held that since the plaintiff had not sought review in any forum during the allotted time there was no prejudice from the uncertainty and therefore equity would not require an extension of the deadline. The court noted that late review was intended to allow challenges based on scientific information arising after establishment of guidelines. (Curran-Florida)
W78-02930

UNITED STATES V. WILSON (ADDITIONS TO RIPARIAN LAND BY ACCRETION).
433 F.Supp. 67-92 (N.D. Iowa 1977).

Descriptors: *Accretion(Legal aspects), *Missouri River, *Avulsion, *Boundary disputes, Iowa, Water law, Bank erosion, Land tenure, Erosion, Indian reservations, Banks, Silts, Soil types, Basins, Channel erosion, Thalweg, Legal aspects, Riparian land, Rivers, Sedimentation, River banks, Boundaries(Property).

Plaintiff reparian landowners sought quiet title to land situated adjacent to the Missouri River. The plaintiffs' claim to the disputed property rests on a treaty which established an Indian reservation with one boundary being the Missouri River. The plaintiffs contended that sudden periodic shifts in the river's course left identifiable reservation land adjacent to the opposite bank. The defendants argued that the disputed property was the result of gradual build-up of silt and was not identifiable as having once belonged to the plaintiffs. The district court, in a lengthy opinion held that the disputed property was the result of accretion and therefore rightfully in the possession of the defendants. The court noted that the central issue was the proper legal definition of and factual predicate for accretion and avulsion. The court held that avulsion was not determined by the location of the thalweg, that accretion did not require the absence of all surface water or uniform extension of the shoreline, and that when common sense shows that the land attached to the shoreline is a growth of the old shoreline, then that land is accreted land. (Curran-Florida)
W78-02931

SOUTHERN MINNESOTA RIVERS BASIN AREA II, GRANTS TO LOCAL GOVERNMENT.
Minn. Stat. secs 104.42 thru 104.50 (1976).

Descriptors: *Legislation, *Grants, *Minnesota, *Flood control, Planning, Financing, Participating funds, Project post-evaluation, South Dakota, Legal aspects, Flood plain zoning, Water conservation, Protection, Water control, Local governments, Flood plains, Rivers, Water law, Research priorities, Water resources development, Governments, Governmental interrelations.

The state of Minnesota has authorized a state grant-in-aid pilot program of providing financial assistance to units of local government located within the watersheds of rivers and streams that are southern tributaries of the Minnesota River for project and construction costs for the building of floodwater retarding and retention structures within a general plan for flood plain mangement. Grants may be made by the state soil and water conservation board in an amount not to exceed 75 percent of the total cost of each project. If federal funds are being used in the project, the state contribution shall not exceed 50 percent of the remaining non-federal costs. If the structure is located in South Dakota, however, the two states shall split the non-federal costs equally. The granting authority shall choose the receiving projects on the basis of data assembled by state and federal agencies. A local government seeking the grant shall submit a resolution including a list of federal and local funds available for the project, a general plan for the project, and an environmental impact statement. After the project has been operated for two years, the board and the staff engineer, shall submit a project report and evaluation to the legislature. (Hammersley-Florida)
W78-02932

PUBLIC WATERS INVENTORY AND CLASSIFICATION.
Minn. Stat. sec 105.391 (1976).

Descriptors: *Minnesota, *Legislation, *Classification, *Watersheds(Basins), *Watercourses(Legal aspects), Water management(Applied), State governments, Water districts, Public rights, Drainage, Grants, Water rights, Water zoning, Administrative agencies, Administration, Water policy, Watershed management, Drainage area, Financing.

Minnesota has enacted legislation requiring the commissioner of natural resources to inventory the waterbasins and watercourses of each county and designate which constitute public waters. A public hearing on the proper designation shall be held in the county where the waters to be designated are located. If a waterbasin has been designated public water, it may not be drained unless it is replaced by a waterbasin having equal or

greater public value. However, after a state waterbank program has been established, a waterbasin which has been designated public water and which is eligible for inclusion in the waterbank program may be drained without a permit and without replacement under certain conditions. The commissioner shall provide financial aid to counties to facilitate an inventory of all watercourses for the purpose of designating which are public waters and to recommend a managment classification for each watercourse. Provision is made for resolving disagreements between the commissioner and the county over the county's watercourse designations. The waters of Minnesota are considered public waters if they have been determined to be public waters or navigable waters by a district or appellate court. (Howard-Florida)
W78-02933

WATER BANK PROGRAM.
Minn. Stat. sec 105.392 (1976).

Descriptors: *Minnesota, *Wetlands, *Legislation, *Land management, *State governments, Water contracts, Water districts, Conservation, Payment, Developed waters, Land development, Land use, Federal project policy, Watersheds(Basins), Project planning, Administrative agencies, Comprehensive planning, Protection, Surface waters, Flood protection, Sedimentation, Planning.

The state of Minnesota has enacted legislation to provide for wetlands preservation and to promote comprehensive and total water management planning. The commissioner of natural resources is authorized to develop a program to promulgate rules and establish procedures and payment rates in order to supplement and complement the federal water bank program. The commissioner is authorized to enter into agreements with owners of wetlands eligible for inclusion in the waterbank program and to establish payment rates for the conservation of wetlands based on current land and crop values. In the agreement between the commissioner and an owner, the owner must agree: (1) to place in the program eligible wetland areas; (2) not to destroy the wetland character of such areas nor use it for agricultural purposes; and, (3) to effectuate the wetland conservation and development plan for his land in accordance with the agreement. In return, the commissioner will make an annual payment to the owner for his participation and will provide advice on conservation and development practices on the wetlands. (Howard-Florida)
W78-02934

HOMER V. DEPARTMENT OF NATURAL RESOURCES (STATE CONVEYANCE OF TIDELANDS UNDER ALASKA LAND ACT).
566 P.2d 1314-20 (Alas. 1977).

Descriptors: *Navigable waters, *Cities, *Land tenure, *Alaska, *Tidal marshes, Tides, Submerged lands, Claims(Contracts), Judicial decisions, Natural resources, Regulation, Legal review, Real property, Administrative decisions, Ownership of beds.

The Alaska Land Act authorizes the Department of Natural Resources to dispose of certain state property through operation of the Tidelands Act. The plaintiff city was denied a claim to certain tidelands in favor of an adverse claim by a private claimant. The city questioned whether the Department director's responsibility for formulating regulations for the filing and processing of applications for claims and adjudication of disputes had been carried out so as to guarantee due process to all claimants. The Supreme Court of Alaska rejected the claims of unreasonable procedures and arbitrary decision-making by the Department stressing that a single set of regulations for settling disputes among all types of claimants was promulgated, and saying that protection of merely contingent economic interests does not require a high degree of due process. Considering the state's fiscal and administrative interests, the Director's comprehensive point-by-point response to the city's claim protest was deemed to accord it sufficient due process. The Department's disposition of the property to the private claimant was upheld. (Spector-Florida)
W78-02935

MARINO PROPERTY COMPANY V. PORT OF SEATTLE (ENVIRONMENTAL IMPACT STATEMENT NOT REQUIRED FOR CHANGE IN OWNERSHIP).
567 P.2d 1125-32 (Wash. 1977).

Descriptors: *Washington, *Port authorities, *Piers, *Environmental effects, Judicial decisions, Legal aspects, State governments, Legislation, Parks, Expenditures, Harbors, Decision making, Property values, Public lands, Recreation facilities, Land tenure.

Plaintiff private property owners sought injunctive and declaratory relief to prevent defendant Port Authority from acquiring two piers in the Seattle harbor. The defendant had issued a Declaration of No Significant Environmental Impact claiming the harbor environment would not be significantly affected by the project. The plaintiffs claimed the issuance of the bonds, the reacquisition of the property and the taking over of the existing use of the property were major actions significantly affecting the environment and therefore required an Environmental Impact Statement under the State Environmental Policy Act. The Supreme Court of Washington ruled that neither the plans nor the proposed gift of a portion of the complex property to the city would have a significant effect on the environment. The court said that neither the plans nor the gift required an Environmental Impact Statement because the underlying legislative policy in the State Environmental Policy Act was directed toward environmental effects resulting from a change in use, not ownership. Whether or not previous changes in use significantly affected the environment was not at issue and not decided. (Easterbrook-Florida)
W78-02936

KOBAYASHI V. ZIMRING (OWNERSHIP OF SHORELINE EXTENSION CREATED BY LAVA FLOW).
566 P.2d 725-57 (Hawaii 1977).

Descriptors: *Hawaii, *Land forming, *Lava, *Accretion(Legal aspects), Public access, Coasts, Volcanoes, Boundaries(Property), Shores, Real property, Land tenure, Legal aspects, Littoral, Judicial decisions, State governments, Oceans.

Plaintiff state of Hawaii brought a quiet title action against the defendants who claimed to be the owners of property created in a previously submerged coastal area by a 1955 lava flow. The court ruled that a shoreline property owner does not acquire title to a lava-extended shoreline even if the pre-existing shoreline is completely destroyed by the extension so that the property no longer has access to the sea. Recognizing that the owner of contiguous land takes title to accreted land in Hawaii, the Supreme Court of Hawaii ruled that lava extensions are different from accretions. The court held that pre-exisiting legal boundaries are to be maintained when lava extensions create new contiguous land, and that the new land created is public land. One justice filed a lengthy dissenting opinion. He felt that allowing private ownership of the lava extensions would not have deprived the state of any rights since the public would still have access to the ocean. (Easterbrook-Florida)
W78-02937

RITTER V. STANDAL (FISH FARM PRECLUDED BY NAVIGABILITY OF ESTUARY).
566 P.2d 769-74 (Idaho 1977).

Descriptors: *Idaho, *Fish farming, *Navigation, *Public access, *Estuaries, Dams, Estuarine fisheries, Navigable rivers, Navigable waters, Public rights, Riparian rights, Riparian waters, State government, Water law, Water permits, Water rights, Watercourses(Legal aspects), Judicial decisions.

Plaintiff landowners sought to require defendent owners of land on an estuary of the Snake River to remove a fish farm that they had constructed in the estuary. The plaintiffs claimed that the fish farm at the mouth of the estuary closed off their access to the river. The plaintiffs also agreed that the Department of Water Administration did not and could not authorize an obstruction of the estuary and that the closing of the estuary as a public highway was a nuisance. The defendants contended that the estuary was not navigable. The Supreme Court of Idaho held that the estuary was navigable under the Idaho test since it could be used to float logs to market during the high water season. The court also held that the defendants' water license from the Department did not authorize the obstruction and that the Department could not authorize such an obstruction. Since the fish farm was held to be a public nuisance, the court upheld the trail court's order that the fish farm be removed. (Jordan-Florida)
W78-02938

WILLIAMS AND EBERLEY, INCORPORATED V. MACLEOD (ADEQUACY OF WATERS AND SEWAGE FACILITIES IN PROPOSED SUBDIVISION).
397 N.Y.S. 2d 262-66 (App. Div. 1977).

Descriptors: *New York, *Sewage disposal, *Water supply, *Environmental effects, *Land development, Administrative decisions, Administrative agencies, Judicial decisions, Modsquitos, Real property, Flood protection, Swamps, Wetlands, Land use, Land, Public health, Municipal water, Permits, Regulation, Standards.

Plaintiff landowner sought an order directing defendant county officials to approve a plan for a residential subdivision. A statute required subdivision plans to include adequate methods for supplying water. Regulations promulgated pursuant to the statute required the developer to show the effect on the subdivision of environmental pollutant or hazards either on the property or from surrounding areas resulting from, among other causes, swamps. On the basis of this regulation, the county denied approval of the plan saying that although the water facility was adequate, the entire subdivision faced potential flooding and mosquito infestation from a nearby swamp. The Appellate Division of the New York Supreme Court held that the hazards named in the regulation would only test the adequacy of the facilities, not constitute independent grounds for denial of subdivision approval. Similarly, the court held another statute requiring a plan for adequate sewage facilities did not authorize a denial other than for inadequacy of those facilities. No public emergency justified exercise of the Health Department's police powers. Securing safety from floods and mosquitos is a land use function exercised by means of zoning powers not delegated to the defendants. (Smith-Florida)
W78-02939

LOCAL GOVERNMENT FLOOD PLAIN COMMISSIONS.
Acts of Indiana, Public Law No. 192, H. 2002, Approved April 21, 1975, Ch. 4.5, p. 1044-53 (1975). 10 p.

Descriptors: *Indiana, *Flood plain zoning, *Legislation, *Regulation, Legal aspects, Zoning, Flood plains, Flood plain insurance, Flood protection, Flood control, Flood proofing, Land use, Local governments, Planning, Land management, State governments, Administrative agencies, State jurisdiction, Governmental interrelations, Structures, Non-structural alternatives.

The state of Indiana has enacted legislation to enable local governments which have not passed land use controls to meet the requirements of the national flood insurance act and Indiana state laws, by authorizing them to establish a single-purpose Flood Plain Zoning Commission. The three-person commission shall have the power to promulgate regulations for flood hazard areas. To assure the public health, safety, and convenience the commission shall prepare a proposed flood plain zoning ordinance which will include classification of all flood plain areas in the particular jurisdiction, and regulate land use in those areas. The proposed ordinance shall be presented to the local legislative body which shall hold public hearings before adopting the plan. Any proposed changes shall be studied by the commission before final action is taken. Flood plain district boundaries less extensive than those established by state or federal agencies may not be adopted. Penalties for violation of the final ordinance may be provided by the local government, which may also seek injunctions to restrain construction of or to remove violating structures. The removal of structures constructed in violation of the zoning ordinance shall be non-compensable. (Malefatto-Florida)
W78-02940

APPROPRIATION AND REGULATION OF GROUND WATER.
Mont. Rev. Code secs 89-2911 through 89-2936 (1947), as amended, (Supp. 1975).

Descriptors: *Montana, *Legislation, *Well regulations, *Groundwater, *Appropriation, Groundwater resources, Water sources, Regulation, Legal aspects, Well permits, Administrative agencies, Control, State governments, Water management(Applied), Management, Penalties(Legal), Permits, Water policy, Water rights, Water resources development, Adjudication procedure, Groundwater avilability, Administration, Water allocation(Policy).

The state of Montana has enacted legislation governing the appropriation and regulation of ground water. Controlled ground water areas may be designated or modified by the Department of Natural Resources and Conservation upon request of a percentage of the ground water users in a particular area. If the Department finds that the withdrawal of ground water exceeds the safe annual yield, it shall order the withdrawal decreased. Any person with ground water rights may initiate a department hearing to ascertain all existing rights in that area. A permit from the Department is required to appropriate ground water from a controlled area. An appropriator of ground water may change the location of his well in the area as long as others are not injured. It is illegal to waste or contaminate ground water. All wells which pollute or waste must be capped. The Department may conduct investigations, including entry upon a ground water user's property, to determine whether this provision is being followed. If violations are found the Department has enforcement powers with violators subject to fines. (Malefatto-Florida)
W78-02941

MONTANA WATER RESOURCES ACT.
Mont. Rev. Code secs 89-101.1 thru 89-142 (Supp. 1975).

Descriptors: *Montana, *Water resources development, *Optimum development plans, *Legislation, Comprehensive planning, Administration, Contracts, Appropriation, Research and development, Water rates, Water policy, Water resources, Water law, Water rights, Eminent domain, Regulation, Alternative planning, Conservation, Jurisdiction, State governments, Water allocation(Policy), Water utilization, Irrigation, Structures.

In recognition of the increased demands placed on the water resources of Montana, the state Department of Natural Resources and Conservation has been granted the authority to actively formulate and effectuate a 'state water plan'. The state water plan shall set out a progressive program for the conservation, development and utilization of the state's water resources and propose the most effective means by which these water resources may be applied for the benefit of the people, with due consideration of alternative uses and combinations of uses. The department's powers include the power of condemnation, the power to construct public works, the power to act beyond the jurisdiction of the state where permitted by law, and the power to construct irrigation works across streams and highways. The department is further authorized to issue bonds and provide financing for all necessary projects. The act grants the department power to enter into contracts for the sale and lease of water, water rights, and waterworks systems with individuals, incorporated users, counties, agencies, other states and the federal government. The department is authorized to negotiate with other states regarding interstate waters. (Curran-Florida)
W78-02942

COLUMBIA INTERSTATE COMPACT.
Mont. Rev. Code secs 89-3201 thru 89-3207 (1947).

Descriptors: *Montana, *Interstate compacts, *Governmental interrelations, *River basin commissions, *Columbia River, State governments, Water law, Administration, Legislation, Interstate, Planning, Water policy, Regulation, Interstate commissions, Interstate rivers, Equitable apportionment, Water resources development, Rivers, Wildlife management, Fish management, Pollution abatement.

The state of Montana has adopted and ratified the Columbia Interstate Compact entered into by Montana with Idaho, Washington, Oregon, Nevada, Utah and Wyoming. The purpose of this compact is to facilitate and promote the orderly, integrated and comprehensive development of the land and water resources of the Columbia River basin through intergovernmental cooperation. The compact provides for an equitable apportionment of the water and creates an interstate commission to consider various common problems with respect to the resources of the region. The compact also affirms the interest of the member states in cooperating in power development. The effects of the compact on state law and preexisting water rights are specified. The commission is granted specific powers to deal with the threat of water pollution, although each state has the primary obligation and responsibility to abate pollution of the Columbia River under its own laws. The commission shall also plan for the development of measures to prevent damage to and enhance the fish, wildlife and recreational resources of the river basin. Regulation of stream flows and pool levels must conform to sound fish and wildlife management practices. (Curran-Florida)
W78-02943

SAGE CREEK BASIN.
Mont. Rev. Code secs 89-3001, 89-3002 (1947).

Descriptors: *Montana, *Canada, *International waters, *Reservoirs, *Water storage, United States, Governments, Reservoir storage, Storage capacity, Water supply, Water distribution(Applied), Watershed management, Water delivery, Canals, Water demand, Storage coefficient, Water utilization, Diversion, Maintenance, Canal construction, Reservoir construction, Legislation, Salt Creek Basin(Mont).

The state of Montana has authorized the governor to assent on the state's behalf to an agreement between the governments of the United States and Canada regarding the waters of Sage Creek Basin. This basin forms the watershed of an international stream. The agreement shall provide for: (1) construction of a storage reservoir in Canada by a Canadian governmental agency; (2) construction of a supply canal to the United States to carry all of the stored water apportioned to Montana ranchers; (3) formation of a water storage society, composed of Canadian ranchers, with the responsibility of maintenance and operation of the apportionment and diversion works. Satisfactory supply canal maintenance is to be the responsibility of the Montana ranchers who will be permitted appropriate access for this purpose. A water apportionment formula is established which shall apply to water remaining in the reservoir at the beginning of the water year, together with season runoff impounded in the reservoir. The flow of water across the international boundary is not to be obstructed in Montana in a manner which causes damage in Canada. (Steger-Florida)
W78-02944

DRAINAGE DISTRICTS.
Mont. Rev. Code secs 89-2201 through 89-2218 (1947).

Descriptors: *Drainage districts, *Montana, *Legislation, *Drainage systems, Water law, State governments, Governments, Drainage area, Drainage programs, Drainage engineering, Legal aspects, Drainage, Ditches, Controlled drainage, Water management(Applied), Water control, Surface waters, Surface runoff, Drains, Public benefits, Land use, Cost-benefit analysis.

The state of Montana has enacted legislation governing the creation and management of drainage districts. Drainage districts are created by petition signed by landowners within the proposed district who desire to construct one or more drains, ditches, levees, waste ditches or other works across the lands of others. Districts may also be created to improve any natural, nonnavigable stream or water course for the promotion of public health of welfare, for the drainage and removal of surface water from the lands, and for the repair and maintenance of previously constructed drainage systems. District territory need not be contiguous. However, if not, it must be so situated that the public health or welfare will be promoted by such drainage; the benefits of the proposed work in each part will exceed the damages from the costs of such work; and the work must be able to be done more cheaply as a single district than otherwise. Provisions for dissolution of drainage districts and other procedural requirements are also included in the statute. (Steger-Florida)
W78-02945

IRRIGATION DISTRICTS; RIGHTS OF WAY; USE AND APPORTIONMENT OF WATER.
Mont. Rev. Code secs 89-1601 thru 89-1617 (1947).

Descriptors: *Irrigation districts, *Montana, *Water rights, *Water utilization, *Legislation, Governments, Water distribution(Applied), Water shortage, Water policy, Irrigation water, Irrigation, Alternative water use, Irrigation programs, Surplus water, Diversion, Streamflow, Canals, Ditches, River flow, Water allocation(Policy), Public rights, State governments, Right-of-way.

The state of Montana has enacted legislation governing irrigation districts. Rights-of-way are established for the construction of irrigation works across highways, railways, canals and other watercourses. However, interference with navigation

and mining or agricultural water rights is forbidden. The diversion of water of any river, creek, stream, canal, or ditch to the detriment of any person having an interest in such watercourse is also proscribed. Guidelines are included concerning the leasing of works or water and the title to property of the district. The use of all water required for irrigation of any district, together with the rights-of-way, is declared to be a public use. Irrigation water is to be apportioned equitably among the lands in the district. Surplus water may be sold for the benefit of the district. The district has the right to substitute and replace district water with water from any watercourse crossed by the irrigation system. The distribution system is defined as the entire works and property of all irrigation districts and penalties for interference with its operation are established. (Steger-Florida)
W78-02946

CLARK FORK RIVER--IMPOUNDING OF WATER--APPROPRIATION.
Mont. Rev. Code secs 89-856 (1947).

Descriptors: *Dam construction, *Appropriation, *Montana, *Impoundments, *Legislation, Idaho, Damsites, Water utilization, Water law, Water users, Watershed management, Watershed(Basins), Dams, Hydroelectric power, Water level fluctuations, Alternative water use, Structures, Irrigation water, Irrigation, Impounded waters, Water distribution(Applied), Water requirements, Water supply, Water allocation(Policy).

The state of Montana has enacted legislation concerning impounding of the waters of the Clark Fork River within the state. Such impoundment or restraint may be permitted for a distance not exceeding twenty-five miles from the Idaho-Montana boundary line by a dam located in the state of Idaho. The dam may be constructed by any person, firm, partnership or corporation authorized to do business in the state of Montana. However, any present of future water appropriations for irrigation and domestic use above the dam in the watershed of the state of Montana shall have priority over water use for power generation at the dam. (Steger-Florida)
W78-02947

OWNERS OF WATER TO SELL SURPLUS; DUTY OF PURCHASER TO DIG DITCHES.
Mont. Rev. Code secs 89-823 thru 89-826 (1947).

Descriptors: *Montana, *Surplus water, *Water rights, *Legislation, Water law, Reservoir operation, Water users, Water utilization, Water supply, Water requirements, Water management(Applied), Water distribution(Applied), Water control, Water sources, Water demand, Payment, Water rates, Water delivery, Water shortage, Ditches, Reservoirs, Reservoir yield, Aqueducts, Damages.

The state of Montana has enacted legislation requiring any person having a surplus of water and the right to use, sell, or dispose of such water to convey and deliver such surplus water upon payment as long as the surplus exists. However, the purchaser must dig the necessary ditches to receive and convey the desired surplus water. Before compelling delivery, he must also pay an amount equal to the necessary cost of tapping any reservoir and putting in gates, gauges or other customary and necessary appliances. The purchaser is then entitled to maintain an appropriate action in law of equity of the enforcement of his right or the recovery of damages arising from a failure to deliver or a wrongful diversion of the water. The purchaser cannot sell his right to use the water nor may he prevent the original owner from retaking and selling it after the purchaser's use is discontinued. (Steger-Florida)
W78-02948

DAM INSPECTION.
Ky. Rev. Stat. Ann. secs 151.293 thru 151.297 (1975).

Descriptors: *Kentucky, *Dams, *Administration, *Inspection, Dam construction, Dam failure, Dam design, Rupturing, Foundation failure, Foundation investigations, Damsites, Barriers, Reservoirs, Retaining walls, Water control, Administrative decisions, Investigations, Administrative agencies, Control, Evaluation, On-site investigations, Regulation, Water level.

The state of Kentucky has enacted legislation governing the inspection of dams. The owner of an existing dam must submit an application for a certificate of inspection when requested by the department. The department must base the granting or denial of the application upon an on-the-ground inspection. The department must show that: (1) the proposed action adequately protects the public safety; (2) all information requested by the department has been provided; and (3) the change in the water level will not significantly interfere with a beneficial use by other water users. The department may categorize dams according to the hazards and impose different conditions on each category. The time periods for the certificate are limited to 5 years. The department may make regular inspection. If an owner fails to comply with the conditions of a certificate of inspection, or it life of property are or may be endangered, the governor may declare a state of emergency which empowers the department to seize control and take whatever steps necessary to render the dam safe. (Kastner-Florida)
W78-02949

IMPROVEMENTS, CONTROL OF WATER POWER.
Ky. Rev. Stat. Ann. sec 268.510 (Supp. 1976).

Descriptors: *Kentucky, *Drainage, *Flood protection, *Channel improvement, *Legislation, Hydroelectric plants, Navigable waters, Drainage systems, Drainage programs, Electric powerplants, Powerplants, Hydroelectric power, Condemnation, Easements, Right-of-way , Eminent domain, Conduits, Non-navigable waters, Navigable rivers, Regulation, Administration, Administrative agencies.

The state of Kentucky has enacted legislation to effect the drainage, protecion and reclamation of the land and other property in any district under this chapter subject to assessment. The board, acting for the district, is given the power to make any improvements deemed necessary to preserve and maintain any works which protected cities from overflow and promoted the public health or general welfare of the community. The board is authorized to hold, control and acquire by donation or purchase, or, if need be, condemn any land, easement, railroad right-of-way, sluice, conduit, sewer, holding basin or franchise in or out of district for any purpose under this chapter. In addition, the board is also given control over all water power created in the district including the power to construct and maintain any hydroelectric powerplants. However, the one restriction imposed is that construction or maintenance of any improvement must not be permitted to impair navigation upon an navigable stream in the state. (Kastner-Florida)
W78-02950

KING V. ADAMS (DUTY OF UPPER LANDOWNER TO PREVENT SURFACE WATER FROM FLOWING UPON LOWER LANDOWNER'S LANDS).
349 So.2d 611-16 (Ala. Civ. App. 1977).

Descriptors: *Surface runoff, *Drainage water, *Alabama, *Surface drainage, *Adjacent landowners, *Land, *Drainage, *Damages, Repulsion(Legal aspects), Compensation, Dams, Ponds, Watershed management, Water, Legal aspects, Penalties(Legal), Ditches, Judicial decisions, Natural flow.

Plaintiff lower landowner sought compensatory and punitive damages for the flooding of his property caused by defendant upper landowner having drained two ponds which had caught surface water falling onto the land or draining from other higher lands. The defendant claimed that when he broke the dams to improve his property, he merely restored the original status quo. The trial court awarded punitive damages and also ordered the defendant to reseal the two ponds. The Court of Civil Appeals found that Alabama does not follow the 'common enemy rule' which permits any landowner to control water on his property to protect same regardless of other injuries. The court held that an upper landowner in rural areas is free to interfere with the flow of surface water for the purpose of improving his property so long as he does not unduly burden a lower property by causing unnecessary damage or interfere with the lower landowner's possessory rights. The court said a breach of this duty is answerable only in damages; in no event must the upper landowner restore the status quo. (Smith-Florida)
W78-02951

KRUSE V. GROKAP, INCORPORATED (EFFECT OF SUBMERGENCE FOLLOWED BY ACCRETION ON OWNERSHIP OF LAND).
349 So.2d 788-92 (Fla. App. 1977).

Descriptors: *Land tenure, *Accretion(Legal aspects), *Florida, *Submergence, *Riparian land, Tides, Tidal waters, Tidal effects, Boundary disputes, Adjacent landowners, Water level fluctuations, Judicial decisions, Land, Real property, Riparian water loss, Riparian waters, Riparian rights, Navigable waters, Gulf of Mexico, Erosion, High water mark.

Plaintiff landowner brought a quiet title action claiming ownership of defendant landowners property. The defendant owned a lot which had gradually become completely submerged by the waters of the Gulf of Mexico. When the waters receded, the plaintiff claimed ownership as riparian owner through accretion. Under Florida law private ownership of land borderig on navigable tidal waters extends to ordinary or mean high tide; therefore, the plaintiff would have title if the mean high tide line had encroached on his property during the process of submergence and if the defendant's lot had undergone accretion. Reversing the trial court, the Second District Court of Appeal found that the mean high tide is determined by averaging the tides over a 19-year period, the duration of a complete tidal cycle. Since plaintiff's evidence covered at best only a five-year period, his ownership was not properly shown. The dissent argued that the rule requiring a 19-year period for averaging the tides had never previously been applied by Florida trial courts. On the basis of this dissent, the majority certified the question of whether the 19-year rule should apply to the Florida Supreme Court. (Smith-Florida)
W78-02952

MOZZETTI V. BRISBANE (DESIGN IMMUNITY AS A DEFENSE TO FLOOD DAMAGE FROM ROAD CONSTRUCTION).
136 Cal. Rptr. 751-59 (App. 1977).

Descriptors: *California, *Flood damage, *Surface drainage, *Storm runoff, *Road, Damages, Floods, Flood control, Rainfall, Runoff, Building codes, Flood protection, Silt, Urban runoff, Culverts, Surface runoff, Design standard, Design criteria, Road design.

Plaintiff landowners brought an action against the city and its engineer to recover damages suffered as a result of flooding of their property due to a road construction project. The plaintiffs owned

property bounded on two sides by roads which the city resurfaced and improved. Surface water from the roads ran into inadequate catch basins. The project design was also defective in other respects. The city claimed a defense of design immunity. The jury found for the plaintiffs and the defendant appealed claiming improper jury instructions on design immunity. The First District Court of Appeal held that the city was not entitled to the defense of design immunity where it was not shown that the city council had approved the specific plans, where is was shown that there were deviations from the original plan, and where part of the cause of the damage was not the result of design defect but rather improper maintenance. The court further held that the trial court did not err in refusing to take judicial notice of a disaster declaration covering the county since the jury had knowledge of the severity of the storm which caused the flooding. (Beamer-Florida)
W78-02953

DYE V. BURDICK (LIABILITY TO DOWNSTREAM LANDOWNERS FOR FLOOD DAMAGE FROM DAM FAILURES).
553 S.W.2d 833-42 (Ark. 1977).

Descriptors: *Arkansas, *Negligence, *Dam failures, *Flood damages, *Earth dams, Dams, Disasters, Floods, Dam foundations, Rupturing, Dam design, Storms, Spill ways, Streams, Legal aspects, Hazards, Risks, Water law, Streamflow forecasting, Runoff, Ravines, Acts of God.

The plaintiffs whose home was destroyed by flooding resulting from the bursting of a dam brought this action for damages against the owners of the property on which the dam was located. The plaintiffs contended that the dam was improperly and inadequately constructed, that the defendants were negligent in not repairing the dam and that the dam created an inherently dangerous condition because it was built in a deep ravine in a runoff area with knowledge of the plaintiffs' presence downstream. The defendants denied liability arguing that they did not construct the dam, that they did use reasonable care in its maintenance and that the dam burst because of an unforeseeably severe rainfall. The Supreme Court of Arkansas reversed the trial court's grant of summary judgement for the defendants. The court noted that landowners are responsible for structures on their property whether or not they constructed them. The court said there was sufficient evidence to submit the case to the jury on the question of negligence, both on direct evidence and res ipsa loquitur, but no basis for strict liability. (Curran-Florida)
W78-02954

ZONING COMMISSION OF SACHEM'S HEAD ASSOCIATION V. LENINSKI (RIGHT OF PRIVATE LANDOWNER TO OPEN BEACH TO PUBLIC USE).
376 A.2d 771-74 (Conn. C.P. 1977).

Descriptors: *Zoning, *Connecticut, *Beaches, *Land tenure, High water mark, Legal aspects, Regulation, Seashores, Low water mark, Jurisdiction, Water law, Legislation, Legal review, Judicial decisions, Public access, Land use, Law enforcement, Recreation, Recreation facilities.

Plaintiff zoning commission sought to enjoin defendant landowner from opening to the public an area of beach owned by him. The defendant's property included a narrow strip of land between the road and the water that was zoned for single family dwellings and for private parks, beaches and docks. The plaintiff contended that opening the beach to the public was a violation of the zoning ordinance. The ordinance did not define 'private' or differentiate it from 'public' nor did it define 'beach'. The Connecticut Court of Common Pleas held that a temporary injunction was not warranted because the meaning of the words 'public' and 'beach' were ambiguous as used in the ordinance. The court said that resolution of the terms must be done at a final trial on all the issues. The court also stated that the zoning commission had failed to prove that the persons using the beach at the landowner's invitation were, in fact, members of the public so that even if the ordinance were valid, the proof of the claimed violation was deficient. (Beamer-Florida)
W78-02955

GRAY V. HUDSON (TITLE TO LAND CREATED BY FILL OPERATION).
375 A.2d 1039-48 (Conn. Super. Ct. 1974).

Descriptors: *Connecticut, *Land tenure, *Landfills, *Boundary disputes, *Riparian land, Legal aspects, Real property, High water mark, Boundaries(Property), Riparian rights, Navigable waters, Permits, Boats, Bulkheads, Reclamation, Water law, Docks, Adjacent landowners, Adverse possession, Riparian waters.

The plaintiff brought this suit to eject the defendant from possession of a small peninsula. The plaintiff's claim to the property in dispute rests on the physical existence, or lack thereof, of the peninsula when the adjacent land was transferred in 1898. The defendant, who has resided in a vessel moored to the side of the peninsula for 26 years, argued that the peninsula did not exist in 1898 and therefore could not have been transferred. He claimed that the area was below the high water mark in 1898, that the peninsula was created by a bulkhead and fill operation in 1907 and that the plaintiff therefore had no claim to the peninsula on which to rest his ejectment suit. The court refused to eject the defendant because the plaintiff failed to prove that he had title to the peninsula. The court held that evidence of the 1907 permit from the secretary of war to dredge a channel and build a bulkhead had not been sufficiently rebutted by the plaintiff and that therefore the plaintiff did not have the requisite title on which to base his ejectment suit. (Curran-Florida)
W78-02956

IN RE LEGISLATIVE ROUTE (THE NECESSITY FOR STATE ENVIRONMENTAL IMPACT STATEMENT FOR BRIDGE REPAIRS).
375 A.2d 1364-69 (Pa. Cmwith. 1977).

Descriptors: *Pennsylvania, *Bridges, *Environmental effects, *Scenic highways, *Repairing, Legal aspects, Eminent domain, Condemnation, Right-of-way, Roads, Highway relocation, Road construction, Scenery, Judicial decisions, Bridge construction, Legislation, Streams, Channels, Channel improvement, Stream improvement, Transportation.

The plaintiff sought to enjoin the state from repairing and replacing several small one-lane bridges and relocating the stream channel over which the bridges run. The plaintiff contended that the state did not comply with a statute which requires a determination of various social, aesthetic and environmental effects of any 'transporation route or program' requiring the acquisition of new or additional right-of-way. The state argues that it need not comply with the statutory requirements because the anticipated construction was essentially repair work and therefore did not constitute a 'transport route or program' within the meaning of the statute. The Commonwealth Court of Pennsylvania overruled the lower court and denied the petition to enjoin the state's activities. The court noted that the term 'transporation route or program' did not include every instance when the state has the power to condemn. The court held that since the social and economic impact of the project would be slight, and since the state had made reasonable efforts to reduce the environmental incursion to a minimum, the state need not comply with the statutory requirements. (Curran-Florida)
W78-02957

OXON HILL RECREATION CLUB, INC. V. WATER RESOURCES ADMINISTRATION (ISSUANCE OF CONDITIONAL PERMIT FOR BRIDGE CONSTRUCTION).
375 A.2d 567-70 (Md. Ct. App. 1977).

Descriptors: *Maryland, *Bridge construction, *Permits, *Administrative decisions, Flood plains, Channel erosion, Bridges, Streambeds, Stream erosion, Silts, Legal review, Sedimentation, Rivers, Streams, Stream stabilization, Administrative agencies, Deposition(Sediments), Public rights, Legal aspects, Flood damage, Banks, Discharge(Water).

Petitioner property owner sought review of respondent Water Resources Administration's issuance of a conditional permit to the county for construction of a new bridge over a creek. The bridge was made necessary by the relocation of a road. The permit was initially denied because the design of the new bridge would cause the stream bed to silt, necessitating constant maintenance and perhaps even the use of heavy equipment in the streambed. The property owner contended that the administration exceeded its authority when it issued a conditional permit. The Board of Review found that the proposed bridge would not affect the habitat, flooding, erosion, sedimentation and stability of the creek. The Maryland Court of Appeals affirming the decision of the Board of Review held that the evidence warranted a finding by the respondent that the conditions imposed by it in regard to its approval of the permit were sufficient to preserve public safety and promote public welfare. The court further held that the respondent had the authority to issue a conditional permit. (Beamer-Florida)
W78-02958

COMMONWEALTH V. BARNES AND TUCKER COMPANY (POWER OF THE STATE TO COMPEL A MINE OWNER TO PREVENT THE DISCHARGE OF UNTREATED ACID MINE WATER).
371 A.2d 461-68 (Pa. 1977).

Descriptors: *Acid mine water, *Mine drainage, *Pennsylvania, *Water pollution, Mine wastes, Eminent domain, Mine water, Mineral industry, Mine acids, Mining, Discharge(Water), Water treatment, Legal aspects, Streams, Coal mines, Coal mine wastes, Permits, Acidic water, Water pollution treatment, Water quality, Water pollution control, Pollution abatement, Economic impact.

Defendant mine owning company appealed a court order requiring it to prevent the discharge of acid mine water from its mine. The mine at issue was operated by the defendant for fifty years before it was sealed pursuant to an order under the Clean Streams Law. The defendant made numerous attempts to remedy the pollution problems which resulted from drainage of acid mine water. The company eventually abandoned the operation of the treatment facility which it had constructed. The Commonwealth of Pennsylvania sought to compel the defendants to assume the cost of its continued operation. The defendant contended that this would be an unreasonable exercise of police power and a 'taking' of property. He also insisted that a majority of the pollution was attributable to fugitive mine water. The Supreme Court of Pennsylvania held that the defendants were liable for the continued operation of the treatment facility since the Clean Streams Act is concerned with the source of offending discharge. The court also said the defendant is liable for abating the nuisance which it had created. (Quarles-Florida)
W78-02959

HYLAND V. BOROUGH OF ALLENHURST (NONRESIDENT FEE FOR MEMBERSHIP IN A MUNICIPAL BEACH FACILITY).
372 A.2d 1133-39 (N.J. Super. Ct. 1977).

Descriptors: *New Jersey, *Beaches, *Public access, *Recreation demand, *Assessments, Local governments, Access routes, Shores, Recreation, Natural resources, Atlantic Ocean, Swimming, Water sports, Recreation facilities, Public rights, Legal aspects, Cities, Swimming pools, Facilities, Taxes, Operating costs, Payment.

Defendant municipality contended that it had the right to charge nonresidents a higher fee than residents for membership in a municipal beach facility. The defendant also insisted that it was not obligated to provide for daily, as opposed to seasonal or half-seasonal use of the facility. The defendant municipality is a small community consisting almost completely of residential dwellings. The adjacent beach is small, especially those parts suitable for recreational use. The beach club at issue has limited facilities and charges higher rates for membership by nonresidents. Nonresidents were charged the same fee as residents for access to and use of the beach in the public trust area. The Superior Court of New Jersey, Appellate Division, held that a municipality may lawfully charge nonresidents a higher fee for membership in a municipal beach facility. The court based its holding on the fact that residents were already paying for club facilities as part of their tax bill while nonresidents were not. Because of the limited facilities of the club, the court rejected the plaintiff's insistence upon the availability of the club for daily use. (Quarles-Florida)
W78-02960

FEDERAL COMMON LAW OF NUISANCE AS A BASIS FOR RELIEF IN ENVIRONMENTAL POLLUTION CASES.
29 A.L.R. Fed 137-206 (1976).

Descriptors: *Water pollution, *Sewage treatment, *Waste disposal, *Judicial decisions, *Common law, Rivers and Harbors Act, Rivers, Streams, Legal aspects, Legal review, Water pollution control, River regulation, Watercourses(Legal aspects), Pollutants, Oil spills, Pesticides, Water pollution, Environment, Federal jurisdiction.

The existence of a federal law of nuisance seems universally accepted, but the scope of its application to environmental pollution cases is not clearly defined. This annotation contains a number of cases based on the nuisance theory. One case held such actions were not available to private party plaintiffs while another impliedly reached the opposite result by allowing private parties to appear as plaintiffs. It has been held that no federal common law nuisance action could be maintained without the prerequisite of interstate pollution. Emission of pollutants from ore-processing plants and smelters has been held to be an actionable federal common law nuisance, as has pollution of water by effluent from sewage disposal systems and by dumping of chemical byproducts without adequate pretreatment. Actions have succeeded against the petroleum industries and in cases asserting interstate pollution effects from agricultural pesticides and the disposal of garbage in such a way that it washed up onto the beaches. Federal common law nuisance action is available in appropriate circumstances, although the Supreme Court is reluctant to exercise its original jurisdiction in such actions. (Mulligan-Florida)
W78-02961

GREAT LAKES PROPERTIES V. CITY OF EL SEGUNDO (ATTORNEYS FEES PROPER FOR PREVAILING PARTY IN ACTION BROUGHT UNDER CALIFORNIA COASTAL ZONE CONSERVATION ACT).
561 P.2d 244-52 (Cal. Sup. Ct. 1977).

Descriptors: *California, *Law enforcement, *Coasts, *Penalties(Legal), Costs, Legal aspects, Judicial decisions, Legislation, Natural resources, Preservation, Conservation, Planning, Long-term planning, Permits, Zoning, Legal review.

Appellant corporation sought a ruling that Section 27428 of the California Coastal Zone Conservation Act of 1972 authorized the award of attorneys' fees only to successful plaintiffs and cross-complaintants. The appellant had been made a defendant in an action under the Act and had filed a cross-complaint against numerous public and private entities. When the cross-complaints were dismissed, the successful cross-defendants were awarded attorneys' fees. The lower court in construing the Act held that the term 'persons' applied both to plaintiffs and defendants, that the term 'shall' created a mandatory obligation. The Supreme Court of California affirmed this application of the plain meaning rule as state policy and cited its deterrent effect upon frivolous litigation. In a lengthy dissent the acting Chief Justice stressed the strong state legislative purpose to preserve the coast line which he felt required an interpretation of Section 27428 authorizing attorneys fees only to persons who successfully prosecuted an enforcement action. (Jones-Florida)
W78-02962

LOVELADIES PROPERTY OWNERS ASSOCIATION, INCORPORATED V. RAAB, (PROCEDURAL REQUIREMENTS FOR CITIZEN SUITS UNDER THE FEDERAL WATER POLLUTION CONTROL ACT).
430 F. Supp. 276-82 (D.N.J. 1975).

Descriptors: *Rivers and Harbors Act, *Landfills, *Permits, *Federal Water Pollution Act, *Navigable waters, Sediment discharge, Legal aspects, Legislation, Judicial decisions, Federal government, Aesthetics, Administrative decisions, Legal review, Water quality, New Jersey, Water quality control, Water law, Federal jurisdiction, Water pollution, Environmental effects, Ecosystems.

Plaintiff taxpayers and property owners challenged the defendant's unauthorized landfill operations along Barnegal Bay. The defendant applied to the Corps of Engineers for an after-the-fact fill permit. The Corps found the operations to be beyond its statutory jurisdiction. After the Environmental Protection Agency refused to act against the defendant, the plaintiffs brought this action under the citizen suit provision in Section 1365 of the Federal Water Pollution Control Act Amendment. Although the United States District Court found the plaintiffs met the standing requirement, the court nonetheless dismissed the action because the plaintiffs did not obey the notice requirements of Section 1365. As jurisdictional alternatives, the plaintiffs brought suit under the Rivers and Harbors Act of 1899 and the Administrative Procedures Act, and also invoked federal mandamus jurisdiction. The court disposed of all three grounds saying the Rivers and Harbors Act did not authorize private civil actions; Administrative Procedure Act did not create an independent jurisdictional basis for suits challenging government agency actions; and mandamus was an extraordinary remedy not applicable to this fact situation. (Cocheu-Florida)
W78-02963

PARSELL V. SHELL OIL COMPANY (NO JURY TRIAL IN OIL SPILL DAMAGES SUIT UNDER FEDERAL ADMIRALTY JURISDICTION).
421 F. Supp. 1275-82 (D. Conn. 1976).

Descriptors: *Federal jurisdiction, *Oil spills, *Water pollution, *Navigable waters, Judicial decisions, Legal aspects, Accidents, Hazards, Constitutional law, Common law, Rivers and Harbors Act, Compensation, Water law, Connecticut, Damages, Jurisdiction, Harbors, Ships.

Private plaintiffs attempted to invoke federal jurisdiction in an action for damages arising out of a harbor oil spill. First the plaintiffs alleged jurisdiction under the Rivers and Harbors Appropriation Act of 1899. The United States District Court for Connecticut held that Congressional intent seemed to require enforcement of this Act by the Justice Department, rather than by private parties. The sole exception, not applicable in this case, is if the defendant has obstructed navigation. The plaintiff also based a claim on the federal common law of water pollution with an interstate effect. Although that was a legitimate cause of action, the court held the plaintiff did not demonstrate an interstate effect. The court found that the plaintiff could invoke federal jurisdiction in an admiralty action. However, in admiralty suits no trial by jury is allowed. Therefore, the court granted the defendant's motion to strike the jury trial demand. (Cocheu-Florida)
W78-02964

SAVE OUR SOUND FISHERIES ASSOCIATION V. CALLAWAY (AWARD OF ATTORNEY'S FEES IN ENVIRONMENTAL CITIZEN SUITS).
429 F. Supp. 1136-48 (D.R.I. 1977).

Descriptors: *Penalties(Legal), *Coasts, *Costs, *Waste disposal, Judicial decisions, Spoil banks, Legal aspects, Water law, Legal review, Dredging, Federal jurisdiction, Law enforcement, Water pollution, Water rights, Aquatic environment, Aquatic habitats, Project planning, Jurisdiction, Oceans, Environmental effects.

Plaintiff environmental interest group requested an award of attorney's fees expended to enjoin defendant federal agency from dumping dredged spoil at an ocean site off Rhode Island coastal waters. Defendant contended that the American Rule denying award of attorney's fees controlled. Plaintiff contended that since the original suit was brought pursuant to the Federal Water Pollution Control Act of 1972 (FWPCA), and the Marine Protection, Research and Sanctuaries Act of 1972 (MPRSA) the provisions in these acts which authorize attorney's fees in citizen suits are applicable. The court ruled that although FWPCA and MPRSA were not used by the trial court to obtain jurisdiction, they were properly pleaded and therefore were available as to the motion for award of attorney's fees. The court also ruled that the plaintiff's failure to provide the sixty-day notice required for citizen suit status was due to defendant's violation of several statutes. The court held that the plaintiff had constructively satisfied the sixty-day notice requirement. Finding no exceptional circumstances which could render the awards inappropriate, attorney fees competitive with prevailing rates in the community were awarded. (Brightman-Florida)
W78-02965

UNITED STATES V. KETCHIKAN PULP COMPANY (STANDARDS OF REVIEW FOR CHALLENGES TO FWPCA DISCHARGE PERMITS).
430 F. Supp. 83-88 (D. Alaska 1977).

Descriptors: *Alaska, *Discharge(Water), *Effluents, *Federal Water Pollution Control Act(FWPCA), Federal government, Legal review, Standards, Legal aspects, Water requirements, Water values, Public rights, Permits, Pulp wastes, Industrial wastes, Water pollution, Legal review, Judicial decisions.

The federal government brought an action alleging that defendant pulp company had failed to meet the effluent discharge requirements of a permit issued under the Federal Water Pollution Control Act. Two environmental groups were allowed to intervene in the action. The United States District Court in Alaska held that once the intervenors had been given an opportunity to object to a consent decree, they had their appropriate day in court and a judgment on consent could be entered. The court stated that the appropriate standard of review of the consent decree was whether the decree adequately protected the public interest and was in accord with the Congressional dictates. The court said that unless the intervenors could substantiate

a claim or show some apparent fault in the decree as illuminated by comments at the public hearings an evidentiary hearing should not be required in support of every decision reached by the government. The consent decree was therefore found to be reasonable. (Denker-Florida)
W78-02966

STATE WATER CONTROL BOARD V. HOFFMAN (LAKE DETERMINED NAVIGABLE AND SUBJECT TO FEDERAL PERMIT JURISDICTION).
427 F.Supp. 589-93 (W.D. Va. 1977).

Descriptors: *Permits, *Rivers and Harbors Act, *Navigable waters, *Jurisdiction, Virginia, Legislation, Rivers, Navigation, Regulation, State jurisdiction, Federal jurisdiction, Lakes, Impoundments, Dams, Piers, Legal aspects, Water law, Artificial lakes.

The Virginia Water Control Board, in an action for declaratory and injunctive relief, challenged the jurisdiction of the Corps of Engineers (Corps) over a certain man-made lake. The lake was created in 1964 for electric power generation by impoundment of a river. The Corps then instituted a program requiring permits for any construction affecting the lake pursuant to the Rivers and Harbors Act of 1899. The Corps' jurisdiction over the lake could only be upheld by the court if the lake was determined to be a navigable water of the United States. The United States District Court reviewed the criteria for navigability and held that: (1) the river was historically a navigable water so that the portion inundated retained its navigable status despite obstruction by dams; and, (2) that contemporary hydrological and survey evidence demonstrated that the river was navigable and that the backwaters of the lake were still navigable by small craft. The Water Resources Development Act of 1976, which excluded from the Corps' jurisdiction bodies of water located entirely within one state, was not applicable. Judgment was entered for defendants, re-affirming the Corps' jurisdiction over construction affecting the lake. (Jones-Florida)
W78-02967

ENVIRONMENTAL DEFENSE FUND, INCORPORATED V. MORTON (FEDERAL AUTHORITY IN APPROVING WATER OPTION CONTRACTS FOR INDUSTRIAL USE).
420 F.Supp. 1037-50 (D. Mont. 1976).

Descriptors: *Montana, *Federal project policy, *Water contracts, *Resource allocation, *Water distribution(Applied), Water rights, Resource development, Competing uses, Irrigation programs, Industrial water, Federal-state water rights conflicts, Water delivery, Water policy, Water resources, Resources, Irrigation systems, Flood protection, Hydroelectric power, Silts, Agriculture, Flood control, Federal Reclamation Law.

Plaintiff environmental groups sought injunctive and declaratory relief to restrain defendant federal agency from undertaking any activities in connection with the contracting, sale, or disposition of water for industrial purposes from certain reservoirs in Montana. The plaintiffs claimed that Congress had authorized the reservoirs exclusively for agricultural irrigation, hydroelectric power, flood and silt control and supplementation of stream flow but not for industrial purposes. Therefore, the plaintiffs contended that the defendant could not divert water for industrial purposes without violating the Flood Control Act and Reclamation Act. The United States District Court held that the agency could approve water option contracts for industrial use under both acts as long as it determined that industrial water use would not impair the irrigation efficiency of the reservoirs. In addition, the court found that the plaintiffs had not property rights in the stored reservoir waters and that their action was premature since no injury had occurred. The court further held that no environmental impact statement was required and that industrial water marketing programs, water contracts and related activities did not violate the percentage allocation program in the Yellowstone River Compact Act. (Denker-Florida)
W78-02968

ROSE V. MITSUBISHI INTERNATIONAL CORPORATION (MARKETABILITY OF TITLE TO LAND BELOW HIGH WATER MARK).
423 F. Supp. 1162-67 (E. D. Pa. 1976).

Descriptors: *Pennsylvania, *Riparian land, *Navigable waters, *Boundaries(Property), Riparian rights, Tidal streams, High water mark, Low water mark, Ownership of beds, Banks, Easements, Legal aspects, Beds, Public rights, Right-of-way, Land tenure, Contracts.

Plaintiff sought damages for breach of contract by defendant corporation. The plaintiff had an option to purchase a deep-water port facility. The defendant had promised to provide funds for the exercise of the option and to participate with the plaintiff in a joint venture involving the deep-water port facilities. The defendant's financing obligation was subject to issuance of a title insurance policy indicating marketable title to the facility. The defendant contended that the title report excepting the property lying beyond the low water mark constituted a cloud on the title. The United States District Court held that the contract condition of clear and marketable title had not been satisfied since the evidence showed a portion of the premises to extend beyond the original low water mark of the river. The court noted that a riparian owner in Pennsylvania had absolute title only to the high water mark and had title between the high and low water marks subject to a navigational servitude. Title beyond the low water line lies with the state. (Capehart-Florida)
W78-02969

OHIO V. GASTOWN, INCORPORATED (STRICT LIABILITY FOR OIL SPILLS UNDER OHIO WATER POLLUTION LAW).
360 N.E.2d 970-73 (Perrysburg Mun. Ct. 1975).

Descriptors: *Ohio, *Oil spills, *Underground storage, *Penalties(Legal), Gasoline, Oil, Oil industry, Water pollution sources, Legal aspects, Oil pollution, Outlets, Water pollution, Water pollution control, Public health, Path of pollutants, Leases, Regulation, Streams, Outlets.

Defendant owner and lessor of an Ohio gasoline station was charged with polluting a public waterway by way of an oil spill emanating from an underground coupling. The resulting oil leakage flowed into a nearby public waterway. Once the oil source was discovered by Ohio environmental protection agents, the defendant, repaired the leak and began oil reclamation operations at his own expense. The defendant contended that it had no criminal liability since it lacked scienter and also because the lessee had control of the station rather than the owner. The state insisted that no criminal intent was required under the statute and that notice to the lessee was notice to the defendant. The court held that the statute is of a regulatory nature passed for the safety, health, and well-being of the community, and that it therefore places strict liability upon the accused and does not require scienter. Furthermore, the actions of the defendant in repairing the leak proved his control over the station rather than the operator, indicatig that the owner was ultimately responsible for the defect. (Quarles-Florida)
W78-02970

QUARLES PETROLEUM COMPANY, INCORPORATED V. UNITED STATES (SUBROGATION UNDER THE FEDERAL WATER POLLUTION CONTROL ACT).
551 F.2d 1201-08 (U.S. Ct. Cl. 1977).

Descriptors: *Insurance, *Compensation, *Federal Water Pollution Control Act, *Oil spills, Judicial decisions, Navigable waters, United States, Oil, Oil pollution, Water pollution, Water pollution sources, Federal government, Water law, Transportation, Reimbursable costs, Oil wastes, Cost repayment.

Plaintiff oil company owned a tanker which overturned as a result of another driver's negligence. The ensuing oil spill into navigable water was removed and the costs incurred were paid for by plaintiff's insurer. The plaintiff sought recovery under the Federal Water Pollution Control Act which requires: (1) a discharge of oil from a facility owned and operated by the plaintiff; (2) a discharge caused solely by an act or omission of a third party; (3) removal of the oil; (4) expenditure by the plaintiff of monies for removal. The government contended that since the plaintiff's insurance company had paid for the oil removal, the plaintiff had incurred no costs and was not entitled to recover. The Court of Claims held for the plaintiff thus allowing an insurer to recover under the doctrine of subrogation. The government also contended that sovereign immunity would prevent suit on behalf of a subrogee. The court rejected this argument saying that the Congressional intent to reduce water pollution as much as possible required encouraging insurance companies to insure by allowing subrogation. (Quarles-Florida)
W78-02971

UNITED STATES V. CALIFORNIA (FEDERAL-STATE WATER RIGHTS CONFLICTS UNDER THE RECLAMATION ACT).
550 F.2d 1239-44 (9th Cir. 1977).

Descriptors: *Federal reclamation law, *Federal-state water rights conflicts, *Appropriation, *State jurisdiction, California, United States, Permits, Reclamation, Reclamation states, Legal aspects, Water law, Water rights, State governments, Governmental interrelations, Reclaimed water, Clean Air Act, Prior appropriation, Judicial decisions.

The United States government sought to appropriate unappropriated water for federal reclamation projects within the state of California without applying to the state Water Resources Control Board and sought a declaratory judgment that it could take such action. The state contended that the federal government must apply to the state board for a permit and comply with conditions contained in it. The federal government insisted that the Reclamation Act of 1902 did not subject federal projects to state permit requirements. The United States Court of Appeals, Ninth Circuit, held that federal installations are subject to state regulation only when and to the extent that Congressional authorization is unambiguous. The court cited leading cases involving similar questions regarding a state's right to regulate federal institutions under the Clean Air Act and the Federal Water Pollution Control Act. Both of these contain broad language that could have been construed as subjecting federal instrumentalities to state laws, but instead were interpreted otherwise. The court also points out that the Reclamation Act was adopted before California's permit requirement existed. (Quarles-Florida)
W78-02972

PACIFIC NORTHWEST BELL TELEPHONE V. UNITED STATES (SOVEREIGN IMMUNITY UNDER THE PUBLIC VESSELS ACT AND SUITS IN ADMIRALTY ACT).
549 F.2d 1313-17 (9th Cir. 1977).

Descriptors: *Rivers and Harbors Act, *Damages, *Channel improvement, *Negligence, Washington, Navigable waters, Lake beds, United States, Legal aspects, Jurisdiction, Permits, Navigation, Channels, Legislation, Lakes, Buoys, Federal jurisdiction, Water law, Judicial decisions.

Plaintiff telephone company sought to collect for damages to one of its submarine cables resulting from defendant federal government's actions in maintaining navigable waters. The cable was laid in accord with a permit issued by the defendant that relieved the United States of any liability for damage caused by operations undertaken by defendant for conservation and improvement of navigation. Although the cable at issue was damaged as a result of such an operation, the plaintiff insisted that the waiver of liability language in the permit was invalidated by the waiver of sovereign immunity by the Public Vessels Act and the Suits in Admiralty Act. The Ninth Circuit Court of Appeals remanded the case holding that in the absence of a more explicit indication of legislative intent, the power of the federal government must remain unimpaired to deny permits or, in granting them, to impose conditions relevant to the regulatory purpose. Although the Public Vessels Act and Suits in Admiralty Act constitute consent by the government to be sued, they do not constitute consent to judgment in all cases. (Quarles-Florida)
W78-02973

TRI-STATE MATERIALS V. UNITED STATES (THE EXTENT OF A SOVEREIGN'S NAVIGATIONAL SERVITUDE IN A CONDEMNATION ACTION).
550 F.2d 1-9 (U.S. Ct. Cl. 1977).

Descriptors: *Navigable rivers, *Eminent domain, *Water table, *Flooding, *Mining, Ohio River, Compensation, Dams, Floodwater, Drainage, Subsurface drainage, Watersheds(Basins), Property values, Navigable waters, Streambeds, Beds, Riparian rights, Riparian waters, Adjacent landowners, Condemnation, Groundwater movement, Gravels, Quarries.

The plaintiffs, owners of a sand and gravel business located beyond the boundaries of the Ohio River bed, sought damages from defendant federal government whose project on the navigable river resulted in a rise in the water table thereby flooding plaintiffs' mine. The court held that defendant's action was a compensable taking. The defendant had contended that it was not liable under several alternative theories arguing that the subterranean flooding from the project was temporary and that the presently offending water was not from the federal project. The Court of Claims dismissed this argument as irrelevant since the flooding was a permanent effect of governmental actions that raised the water table and prohibited the land's previous unimpaired drainage. The court also rejected defendant's argument based on the sovereign's navigational servitude which allows the government to invade property rights within a stream bed without paying compensation when the purpose is to aid navigability. This argument failed because the land at issue was beyond the bed of a navigable stream. Furthermore, the value claimed to have been taken was not derived from access to or use of a navigable stream. (Quarles-Florida)
W78-02974

NEVADA WATER POLLUTION CONTROL LAW.
Nev. Rev. Stat. secs 445.131 through 445.354 (1975).

Descriptors: *Legislation, *Nevada, *Water pollution control, *Water pollution, Pollutants, Abatement, Water pollution treatment, Water quality control, Water treatment, Toxicity, Permits, Water resources development, Water law, Planning, Discharge(Water), Pollution abatement wastes, Water pollution effects, Administrative agencies regulation, Land development.

Nevada public policy is to restore and maintain the integrity of waters, to reduce and eliminate pollution and to plan the development of land and water resources. Powers and duties of the state environmental commission and procedures governing its operation are set forth. Water quality standards and effluent limitations are to be established by the commission. The department of human resources is the state water pollution control agency; guidelines for the department director are given. The department regulates the discharge of pollutants from any point source into state waters through a permit program. Conditions, terms, restrictions and fees for permits are described, as well as procedures for revocation or suspension of permits. A state water planning process consistent with federal requirements regarding effluent limitations, compliance schedules, and waste management plans shall be conducted by the department. It will also regulate the discharge of radioactive and toxic wastes and may require monitoring and recording of pollutant discharges. Violations of these statutes may be remedied by the director through compliance orders, injunctive relief, or by requesting civil or criminal penalties. (Mulligan-Florida)
W78-02975

LAROSE V. CAMPBELL (LIABILITY FOR INTERRUPTION OF MERE SURFACE DRAINAGE).
363 N.E.2d 1330-33 (Mass. Ct. App. 1977).

Descriptors: *Massachusetts, *Watercourses(Legal), *Floods, *Surface waters, *Drainage effects, Drainage, Surface runoff, Drainage area, Surface waters, Water sources, Water law, Legal aspects, Riparian rights, Judicial decisions, Negligence, Adjacent landowners, Flood damage, Damages, Runoff.

Plaintiff landowner brought suit against a neighboring landowner claiming that the defendant had interrupted the surface drainage across the plaintiff's land. The Appeals Court of Massachusetts held that no natural watercourse came into existence until the surface waters had flowed from the plaintiff's land across a non-party's land and onto the land of the defendant. The court refused to expand the definition of natural watercourse to include surface water on the plaintiff's land. In addition, the court held that no action would lie against a landowner for interruption of mere surface drainage from neighboring lands. The rule is different where an owner discharges the water onto his neighbor's land by a definite artificial channel or where he artificially retains the water in such a way that it is deflected upon other land. However, there was no such finding in the present case of any such artificial channeling or retention by individual defendants. The court also held that no prescriptive easement of drainage over anothers land can arise where the water leaving the upland is mere unchanneled surface water. (Maass-Florida)
W78-02976

DELANO V. COLLINS (REASONABLE ALTERATION OF NATURAL RUNOFF PATTERNS BY LANDFILL FOR IMPROVEMENT OF RESIDENTIAL PROPERTY).
364 N.E.2d 716-21 (111. Ct. App. 1977).

Descriptors: *Illinois, *Boundaries(Property), *Adjacent landowners, *Runoff, Legal aspects, Surface drainage, Drainage systems, Storm runoff, Storm drains, Floods, Judicial decisions, Land development, Land fills, Land use, Topography, Diversion, Alteration of flow, Flood damage.

Plaintiff landowner sought to restrain defendant landowner from allowing natural runoff to enter the plaintiff's property and to require restoration of the defendant's property to its previous condition. The defendant owned property which adjoined the plaintiff's property on two sides. Since the natural runoff pattern of the area was generally northeast to southwest, runoff from the defendant's property drained directly onto the plaintiff's property causing flooding during periods of intense rainfall. In developing the defendant's parcel, 116 truckloads of landfill were spread on the property to improve drainage for the construction of a home. The plaintiff alleged that the defendant had altered the natural runoff condition by the addition of the fill dirt, increasing the runoff onto the plaintiff's land. Applying the rule in Illinois which allowed for a reasonable interference with the natural flow of water to enhance farmland 'in the interest of good husbandry', the Illinois Appelate Court held for the defendant. The court expanded the Rule of Reasonableness to include the improvement of property for the construction of a home, and stated that the acts of the defendant had not been proved unreasonable. (Yawn-Florida)
W78-02977

GROUND WATER AND WELLS.
S.D. Comp. Laws Ann. secs 46-6-3 thru 46-6-6.2 (Supp. 1977).

Descriptors: *South Dakota, *Water allocation(Policy), *Wells, *Appropriation, *Water shortage, Water conservation, Water policy, Water resources, Water sources, Hydrologic data, Domestic water, Industrial water, Water rights, Permits, Water control, Water supply, Groundwater, Administration, Irrigation wells, Administrative agencies, Legal aspects, Legislation, Subsurface waters, Beneficial use.

Subject to vested rights, any person desiring to appropriate any ground water in South Dakota must give notice to the water rights commission specifying such information as the proposed beneficial use, the well location, and the amount of water desired. No application is required for most domestic use although domestic users must give notice of their intent to drill. However, large domestic users such as municipalities must file an application. The commission is authorized to adopt rules and regulations to assist in the collection, preservation and publication by the state geological survey of hydrologic data. The commission is further authorized to regulate the location and capacity of irrigation, industrial, municipal and other large capacity wells to ensure water for reasonable domestic use without the necessity of requiring maintenance of artesian head pressure in a domestic use well. The rules and regulations shall also provide standards for construction and operation of wells. When a shortage of ground water exists the commission shall require a reduction in output, based on the degree of contribution to the shortage, of all large capacity wells in the area. The commission shall penalize noncompliance by fines. (Beamer-Florida)
W78-02978

SOUTH DAKOTA CONSERVANCY DISTRICT.
S.D. Comp. Laws Ann. secs 46-17-1, 46-17-3 (Supp. 1977).

Descriptors: *South Dakota, *Water conservation, *Water supply, *Water resources, *Water districts, Conservation, Wildlife conservation, Fish conservation, Erosion control, Beneficial use, Water utilization, Water quality control, Water yield improvement, Water resources development, Legislation, Administration, Administrative agencies, Supply, Water yield, Planning, Water demand, Water policy, Recreation.

South Dakota recognizes the limited supply of and increasing demand for water for agricultural and other beneficial uses and the need for more effective development and utilization of land and water resources. In order to make the fullest use of waters available and promote prosperity and the general welfare, the state has created the South Dakota Conservancy District. The district will begin the construction of water resource facilities

for the conservation, storage, distribution and utilization of water. The district will also encourage, promote and assume responsibility for the development of water resources by providing state water resources planning. The district will conserve, regulate and control the waters of the state by providing for flood protection, recreation, municipal and industrial water supply, water quality enhancement, scenic rivers, navigation, beautification, fish and wildlife benefits, and erosion control. It will protect and improve water quality wherever possible. The district has the responsibility for preparing and submitting a statewide water plan for development of a state water resources development system. This plan must be supplemented yearly and updated at least every four years. (Beamer-Florida)
W78-02979

OAHE IRRIGATION PROJECT.
S.D. Comp. Laws Ann. secs 46-17A-3.1 thru 46-17A-3.3. (1967), as amended, (Supp. 1977).

Descriptors: *South Dakota, *Irrigation programs, *Irrigation, *Legislation, Irrigation engineering, Conservation, Soil management, Channeling, Water supply, Supply, Environmental effects, Wildlife, Habitat improvement, Wildlife conservation, Administration, Administrative agencies, Governments, Management, Soil environment, Federal government.

South Dakota has enacted supporting continuation and completion of the Oahe irrigation project. Funding for the project will be appropriated by the Congress and the President of the United States. A state Oahe unit task force, consisting of seven members is created. The task force is composed of the governor, two members of the Oahe conservancy subdistrict board chosen by that board and four members chosen from the state legislature. The task force is to monitor and examine the Oahe unit as outlined in the construction schedule of the bureau of reclamation and report to the legislature annually on the progress of the project. Where appropriate, the task force is to pursue or assist in pursuing modification and improvement of the project in the areas of canal side irrigation, soil preservation, channelization, public access to project data, municipal, rural and industrial water supply, beneficial economic and environmental purposes and wildlife mitigation and enhancement. (Beamer-Florida)
W78-02980

WILD, SCENIC AND RECREATIONAL RIVERS.
S.D. Comp. Laws Ann. secs 46-17A-20, 46-17A-21 (1967), as amended, (Supp. 1977).

Descriptors: *South Dakota, *Wild rivers, *Natural resources, *Preservation, Recreation, Rivers, Streams, Legislation, Parks, Conservation, Water resources, Protection, Natural flow, State government, Governments, Administration, Scenery, Fish, Wildlife, Water conservation, Wildlife conservation, Public benefits, Value, Aesthetics.

The board of natural resource development, with help of the game, fish and parks commission, is to consider the designation of certain South Dakota rivers or sections of rivers as 'wild, scenic and recreational rivers'. No development detrimental to the natural and scenic beauty of the designated rivers will be allowed. The board must also designate certain 'wild scenic and recreational river areas' as part of the preservation of the diminishing resource of free flowing rivers and streams in the state. Areas with free flowing rivers and streams that posses unique natural scenic beauty, water conservation, fish, wildlife and outdoor recreational values are to be recommended by the board for this designation. The purpose of this designation is to preserve these areas for the present and future benefit of the people of the state. (Beamer-Florida)
W78-02981

BELLE FOURCHE RIVER COMPACT.
S.D. Comp. Laws Ann. secs 46-30-1, 46-30-2 (1967).

Descriptors: *South Dakota, *Interstate compacts, *Interstate rivers, *Water allocation(Policy), Equitable apportionment, State governments, Federal government, Federal-state water rights conflicts, Water rights, Rivers, Diversion structures, Reservoir storage, River basins, Dams, Conduits, Tributaries, Legislation, Flood control, Irrigation, Canals, United States, Appropriation, Gaging stations, Wyoming.

The state of South Dakota has ratified the Belle Fourche River Compact. The compact, between Wyoming and South Dakota, allocated 90% of the unappropriated waters of the Belle Fourche River Basin and its tributaries to South Dakota and 10% to Wyoming, exclusive of Wyoming's right of unrestricted use of the waters for domestic and stock purposes. Each state may store or temporarily divert any of the other's unused portion. Each state shall have the right to acquire property rights in another state, to construct and use storage and diversion works to protect its allocated water, and to regulate and conserve the other state's allocated water. Certain restrictions are imposed on size and use of reservoirs. Suitable water gauging stations shall be constructed to ensure compliance with the compact. Appropriations are adjudicated in the state of storage or diversion and confirmed and recorded in the other state assuming it uses all or a portion of the water. The rights and powers of the United States in and to the waters are unimpaired, but it shall give due consideration to the compact's objectives when exercising those rights. (Smith-Florida)
W78-02982

FLOOD CONTROL AND STREAM IMPROVEMENT.
S. D. Comp. Laws Ann. secs 9-36-1 thru 9-36-17 (1967).

Descriptors: *Stream improvement, *Legislation, *Flood control, *Condemnation, *South Dakota, Easements, Flood protection, Streams, Rivers, Floods, Jurisdiction, Dam failure, Bulkheads, Docks, Levees, Dams, Breakwaters, Real property, Land tenure, Navigation, Assessments, Costs, Damages, Engineering structures.

The state of South Dakota has enacted legislation granting municipalities the power to establish, define, and improve the boundaries of rivers and streams within their corporate limits. A survey and plat of proposed lines must be filed and notice of the proposed boundaries must be given. Property owners affected by these boundaries may file objections and appeal an adverse decision. A municipality may acquire land or perpetual easements within the new boundaries, improve the boundary line with walls, walks, and driveways, and, if needed for said improvements, acquire land outside of the boundaries. In addition, a municipality may make navigation and flood control improvements along or across the river. Owners of abutting property may be required to construct and maintain such improvements at their own cost. An owner who neglects this duty is liable for damages his neglect causes except for dam breakings or unusual torrential floods. Any municipality may join with other governmental units to prevent flooding. (Smith-Florida)
W78-02983

REFUSE IN PUBLIC PLACES AND STREAMS.
S.D. Comp. Laws Ann. sec 9-32-10 (1967).

Descriptors: *Domestic wastes, *Legislation, *South Dakota, *Municipal water, Bodies of water, Streams, Pollutants, Water pollution sources, Water pollution, Water quality, Water pollution control, Regulation, Abatement, Wastes, Cities.

The state of South Dakota has enacted legislation granting a municipality the power to regulate and prevent the placing of refuse in any body of water or stream within the boundary of the municipality. (Smith-Florida)
W78-02984

OVERFLOW AND FLOODING FROM WELLS AND DISTRIBUTION WORKS.
S.D. Comp. Laws Ann. secs 46-9-1 through 46-9-4 (1967).

Descriptors: *South Dakota, *Artesian wells, *Irrigation systems, *Flood damage, Water quality, Water wells, Irrigation, Water pollution, Irrigation practices, Irrigation operation and maintenance, Irrigation ditches, Irrigation canals, Canals, Ditches, Irrigation effects, Drainage effects, Flooding, Runoff, Overflow, Floodwater, Runoff, Damages, Waste water disposal.

The state of South Dakota has enacted legislation making any person or irrigation district who owns any canals, laterals or ditches, or irrigation works civilly liable for any damage caused from the neligent discharge of waste water or from overflow. The person claiming damages must notify the owner as promptly as possible depending upon the circumstances, but in all cases at least thirty days before commencing an action. The action itself must be brought within sixty days after the infliction of the injury. In the event of water overflowing from an artesian well and obstructing a public highway, the person owning, or having control of, such well will be given written notice of the violation. If theowner does not act within ten days of receiving notice, the governing body, board, or officer may care for or remove the water causing the obstruction, damage or interference. The governmental unit may then seek to recover the amount expended from the owner in the proper court. (Kastner-Florida)
W78-02985

TECHNOLOGY IS NOT ENOUGH: THE PROVISION AND MAINTENANCE OF APPROPRIATE WATER SUPPLIES,
For primary bibliographic entry see Field 6B.
W78-03059

NATURAL RESOURCES POLICY 1975-1985,
New Mexico Univ., Albuquerque. Dept. of Economics.
A. V. Kneese.
Journal of Environmental Economics and Management, Vol 3, No 4, December 1976, p 253-288. 2 tab.

Descriptors: *Natural resources, *Federal government, Taxes, Economics, Exploitation, Competition, Institutions, Water policy, Governmental interrelations, *National policy, Extractive industries, Governmental reorganization.

An alternative natural resources policy for the U.S. is offered to replace what is described as a policy which is inconsistent, often outdated, and grossly overdependent on direct regulation vis-a-vis adjustments in the defective system of economic incentives. It is also argued that present policy fails to recognize the web of interdependences among all resource problems, including those of environmental resources. Chief elements in the alternative proposal are reduced reliance on direct regulation, increased reliance on economic incentives, measures to cancel unfavorable distributive effects, measures to improve the competitiveness and performance of the natural resource industries, and reorganization of both legislative and administrative branches of government. Included in federal government reorganiza-

tion would be creation of a department of natural resources with strong analytical capability and oriented toward viewing resource policy problems as interdependent and requiring integrated government action. Also endorsed is a modified committee structure in Congress. Among tax policies proposed would be an end to special tax treatment for extractive industries and an increase in the severance tax on extractive activities. (Coyle-Wisconsin)
W78-03083

6F. Nonstructural Alternatives

THE MARSHLAND ISSUE: LEGISLATIVE COMPENSATION FOR LOSSES RESULTING FROM GOVERNMENTAL LAND USE REGULATIONS -- FROM INVERSE CONDEMNATION TO PRODUCTIVE USE,
For primary bibliographic entry see Field 6E.
W78-02853

THE TAKINGS ISSUE IN A NATURAL SETTING: FLOODLINES AND THE POLICE POWER,
Tennessee Univ., Knoxville. School of Law.
Z. J. Plater.
Texas Law Review, Vol. 52, No. 2, p. 201-56, January 1974.

Descriptors: *Flood damage, *Flood plain insurance, *Flood plain zoning, *Permits, Floods, Flood control, Flood recurrence interval, Real property, Property values, Land tenure, Flood plains, Flood protection, Regulations, Social impact, Costs, Public benefits, Legislation, Constitutional law, Legal review, Legal aspects.

Unchecked development of flood plain areas based on private property rights inevitably leads to public financial losses, federally-funded flood insurance, expensive clean-up and restoration of public services, expensive but only partially successful flood control efforts. Three governmental options exist for resolving the flood problem: continuing the present system of supporting private floodplain development both before and after floods as a common burden, conquering the rivers so that they threaten neither lives nor property, or ceasing to fight with nature over the floodplain. To avoid waste and prohibitive expense, governments should move toward the principle that the only acceptable development of floodplains should provide benetifs exceeding all true costs. Outright purchase of all flood plains is a financial impossibility, and floodplain restrictions have often been voided because they appear to be a taking of property without just compensation. The answer to legally supportable restrictions lies in a diminution-balancing test which recognizes public losses but incorporates fair treatment for private individuals. This could be accomplished by realistic flood plain regulation under a permit system. (Jones-Florida)
W78-02857

6G. Ecologic Impact Of Water Development

BIBLIOGRAPHY OF STRIP MINE ECOLOGY,
Iowa State Univ., Ames. Energy and Mineral Resources Research Inst.
For primary bibliographic entry see Field 5G.
W78-02744

NEW RIVER (HEARINGS ON S. 158, WHICH PROVIDE FOR DESIGNATION OF A SEGMENT OF THE NEW RIVER WITHIN THE NATIONAL WILD AND SCENIC RIVERS SYSTEM).
For primary bibliographic entry see Field 6E.
W78-02819

DESIGNATION OF MISSOURI RIVER SEGMENT AS A WILD AND SCENIC RIVER (HEARINGS ON S. 1506).
For primary bibliographic entry see Field 6E.
W78-02820

TO AMEND THE WILD AND SCENIC RIVERS ACT AND TO DESIGNATE CERTAIN LANDS AS WILDERNESS (HEARINGS ON S.3613, 3788, AND 2708).
For primary bibliographic entry see Field 6E.
W78-02821

DESIGNATION OF OBED RIVER SEGMENT AS A WILD AND SCENIC RIVER (HEARINGS ON H.R. 13067 AND 13303).
For primary bibliographic entry see Field 6E.
W78-02822

SOME RESULTS OF COMPARING THE ECOLOGICAL SCALES OF RAMENSKII, ELLENBERG, HUNDT AND KLAPP, (IN RUSSIAN),
Leningrad State Univ. (USSR). Biological Inst.
Yu. I. Samoilov.
Bot Zh. 58(5), p 646-655, 1973.

Descriptors: *Ecology, *Ecological distribution, Water quality, *Aquatic plants, *Classification Alopecurus-pratensis, Angelica-sylvestris, Carex-gracilis, Carex-humilis, Carex-inflata, *Ecological scales, Germany, Koeleria-gracilis, *Meadow, Medicago-falcata, Phleum-phleoides, Ranunculus-repens, Sphagnum-dusenii, Stipa-capillata, Stipa-pennata, Trifolium-montanum, USSR.

Since ecological scales are quite useful in geobotanical investigations and their use is being held up by the absence of narrow regional scales, the existing scales were compared to estimate the errors possible when using these scales beyond the limits of the regions for which they were compiled. A comparison of the Ramenskii ecological scale for evaluating the water supply of plants in the USSR with the Ellenberg, Hundt, and Klapp scales complied for the southern and central regions of East and West Germany, which differ from the center of the European part of the USSR in climate, set of species (Medicago falcata, koeleria gracilis, Phleum phleoides, Ranunculus repens, Carex gracilis, C. humilis, C. inflata, Sphagnum dusenii, Stipa capillata, S. pennata, Trifolium montanum, Alopecurus pratensis, Angelica sylvestris), soil rechness and degree of cultivation of meadows, showed that the amplitudes of the same plant species (more than 200) according to all these scales coincide completely sufficiently for any of them to be used for characterizing the confinement of communities to a certain water supply. This conclusion was checked by ranking a number of meadow associations with the use of the indicated scales.--Copyright 1974, Biological Abstracts, Inc.
W78-02874

BUILDING A BETTER SMALL WATERSHED PROGRAM,
For primary bibliographic entry see Field 4D.
W78-02876

RISK ANALYSIS METHODS FOR DEEPWATER PORT OIL TRANSFER SYSTEMS,
Transportation Systems Center, Cambridge, MA.
For primary bibliographic entry see Field 5C.
W78-03098

STUDIES AND INVESTIGATIONS OF THE FATE AND EFFECT OF THE SHELL OIL SPILL, PLATFORM B, BLOCK 26, SOUTH TIMBALIER BAY (DECEMBER 1, 1970 - NOVEMBER 30, 1971),
Resources Technology Corp., Houston, TX.
For primary bibliographic entry see Field 5C.
W78-03106

MOVEMENT OF SPILLED OIL OVER THE BEAUFORT SEA SHELF - A FORECAST,
Coast Guard Research and Development Center, Groton, CT.
For primary bibliographic entry see Field 5B.
W78-03108

7. RESOURCES DATA

7A. Network Design

DESIGN OF REPRESENTATIVE AND KEY RAINGAUGE STATIONS NETWORK FOR FLOOD FORECASTING IN YAMUNA AND DAMODAR RIVERS,
Meteorological Office, New Delhi (India).
For primary bibliographic entry see Field 2B.
W78-02797

7B. Data Acquisition

A COMPUTER-AIDED AERIAL PHOTOGRAPHIC ANALYSIS OF FIRE ISLAND INLET GEOMORPHOLOGY,
Army Engineer Waterways Experiment Station, Vicksburg, MS.
For primary bibliographic entry see Field 4A.
W78-02761

HOW MUCH RAIN DOES A RAIN GAGE GAGE,
Agricultural Research Service, Sidney, MT. Northern Plains and Water Research Center.
For primary bibliographic entry see Field 2B.
W78-02786

STUDY ON THE ESTIMATE OF PRECIPITATION WITH THE HELP OF S-BAND AT RADAR CALCUTTA,
Regional Meteorological Center, Calcutta (India).
For primary bibliographic entry see Field 2B.
W78-02795

TESTING THE EFFICIENCY OF ALGORITHMS AND STRATEGIES FOR AUTOMATIC CALIBRATION OF RAINFALL-RUNOFF MODELS,
Papua and New Guinea Univ., Port Moresby (New Guinea). Dept. of Geography.
For primary bibliographic entry see Field 2A.
W78-02798

POSSIBILITY OF IDENTIFYING PRECIPITATION FROM MICROWAVE MEASUREMENTS FROM SATELLITES,
For primary bibliographic entry see Field 2B.
W78-02803

ESTIMATE OF THE ACCURACY OF VARIOUS METHODS FOR COMPUTING TOTAL EVAPORATION IN THE MOUNTAINS OF KAZAKHSTAN AND SOVIET CENTRAL ASIA,
For primary bibliographic entry see Field 2D.
W78-02804

LEACHATE TESTING TECHNIQUES SURVEYED,
Mitre Corp., McLean, VA. METREK Div.
For primary bibliographic entry see Field 5A.
W78-02816

FLOW MEASURING METHOD AND APPARATUS,
TRW Inc., Redondo Beach, CA. (Assignee).
R. G. Morrison.

U.S. Patent No. 4,015,470, 10 p, 3 fig, 8 ref; Official Gazette of the United States Patent Office, Vol 957, No 1, p 67, April 5, 1977.

Descriptors: *Patents, *Flow, *Closed conduit flow, *Measurement, Instrumentation, Acoustics, Sound waves, Velocity, Density, Temperature, Sonic velocity.

An improved acoustic method and instrument is provided for measuring certain variables of a fluid flowing through a conduit. These variables are flow velocity, mass flow rate, sonic velocity (i.e. velocity of sound in the fluid), compressibility, temperature, and density. The fluid variables are measured by transmitting acoustic pulses through the conduit wall and fluid stream along transmission paths normal to and oblique to the conduit axis between acoustic transducers located externally of the conduit, measuring the transit times of the pulses along the two paths, and combining these transit times with certain conduit and transducer parameters according to predetermined mathematical relationships to obtain the values of the variables. One feature of the invention resides in the fact that the transit times of the acoustic pulses along the oblique transmission path are measured in both directions of pulse transmission along the path to cancel out the effect of temperature on the flow measurement. (Sinha-OEIS)
W78-02889

SPHERICAL ELECTROMAGNETIC WATER CURRENT VELOCITY SENSOR WITH PROTRUDING ELECTRODES,
Marsh-McBirney, Inc., Rockville, MD. (Assignee).
L. B. Marsh.
U.S. Patent No. 4,015,471, 6 p, 7 fig, 2 ref; Official Gazette of the United States Patent Office, Vol 957, No 1, p 67, April 5, 1977.

Descriptors: *Patents, *Flowmeters, *Instrumentation, *Currents(Water), Measurement, Equipment, Electrodes, Electromagnetic flowmeters, Magnetic fields.

This invention relates to an improved electromagnetic flowmeter which is particularly suitable for measuring water currents, both vertical and horizontal, in oceans, lakes, and other natural bodies of water, as well as in various man-made reservoirs and containers in which there is water motion. An electromagnetic fluid current velocity sensing apparatus is provided including a spherical non-ferromagnetic probe body adapted to be submerged in the fluid current. A first coil is mounted in the spherical probe body for establishing a first magnetic field in the fluid. Circumferentially spaced pairs of diametrically arranged electrodes are contained in a common first plane normal to the magnetic axis of the first coil. Two-axis response is achieved through the use of a single coil for producing a magnetic field the axis of which is normally vertical, first and second orthogonally arranged pairs of diametrically opposed electrodes being provided, which are contained in a plane normal to the magnetic axis of the first coil. Three-axis response is achieved by providing a second coil for producing a second magnetic field the axis of which is contained in the first plane and which bisects the diameters of the first and second pairs of electrodes. A third pair of diametrically arranged electrodes are provided which are contained both in the first plane and in a second plane normal to the axis of the second magnetic field. The first and second coils are alternately energized and de-energized in opposite senses, respectively. (Sinha-OEIS)
W78-02890

UNDERWATER SAMPLER,
Benthos, Inc., N. Falmouth, MA. (Assignee).
For primary bibliographic entry see Field 2J.
W78-02903

APPLICATION OF REMOTELY SENSED LAND-USE INFORMATION TO IMPROVE ESTIMATES OF STREAMFLOW CHARACTERISTICS,
Geological Survey, Reston, VA. Water Resources Div.
For primary bibliographic entry see Field 4A.
W78-03136

7C. Evaluation, Processing and Publication

LAKE-LAND PRECIPITATION RELATIONSHIPS USING NORTHERN LAKE MICHIGAN DATA,
National Oceanic and Atmospheric Administration, Ann Arbor, MI. Great Lakes Environmental Research Lab.
For primary bibliographic entry see Field 2B.
W78-02807

WATER QUALITY INSTRUCTIONAL RESOURCES INFORMATION SYSTEM. VOLUME I. USERS MANUAL.
National Training and Operational Technology Center, Cincinnati, OH.
For primary bibliographic entry see Field 5A.
W78-02882

WATER QUALITY INSTRUCTIONAL RESOURCES INFORMATION SYSTEM. VOLUME II. IRIS TABLES. THESAURUS, SOURCE CODE TABLE AND SOURCE NAME TABLE.
National Training and Operational Technology Center, Cincinnati, OH.
For primary bibliographic entry see Field 5A.
W78-02883

WATER QUALITY INSTRUCTIONAL RESOURCES INFORMATION SYSTEM. VOLUME III. IDENTIFICATION NUMBER MASTER REPORT.
National Training and Operational Technology Center, Cincinnati, OH.
For primary bibliographic entry see Field 5A.
W78-02884

WATER QUALITY INSTRUCTIONAL RESOURCES INFORMATION SYSTEM. VOLUME IV. SUBJECT INDEX.
National Training and Operational Technology Center, Cincinnati, OH.
For primary bibliographic entry see Field 5A.
W78-02885

SURFACE-WATER AVAILABILITY, CALHOUN COUNTY, ALABAMA,
Geological Survey, Tuscaloosa, AL. Water Resources Div.
J. R. Harkins.
Alabama Geological Survey, University, Map 128, 1972. 11 p, 5 fig, 1 tab, 13 ref.

Descriptors: *Available water, *Surface waters, *Streamflow, *Water quality, *Alabama, Flow rates, Water yield, Low flow, Hydrology, Rainfall-runoff relationships, Hydrologic data, Water temperature, Potential water supply, Maps, Calhoun County(Ala).

On the average Calhoun County in Alabama receives about 1,500 million gallons of precipitation each day. Of this, about 950 million gallons is evaporated or transpired to the atmosphere. Thus, the average daily streamflow within the county from precipitation is about 550 million gallons. An average of about 110 million gallons enters the county daily by way of streams flowing from areas north and east of the county. Hence, the average volume of water available daily from the small streams of the county is about 660 million gallons, a volume 33 times greater than the present average daily use of 20 million gallons. In addition, large quantities of water are available from the Coosa River which has an average flow of 6,200 mgd or about 300 times greater than the present rate of use. The water in streams in Calhoun County is generally of good chemical quality. Total dissolved solids in general are less than 160 mg/liter, although the hardness ranges from soft to hard. Water temperature ranges from about 3 degrees C (38 degrees F) in January to 28 degrees C (82 degrees F) in July and August. (Woodard-USGS)
W78-03113

SURFACE WATER, BULLOCK COUNTY, ALABAMA,
Geological Survey, Tuscaloosa, AL. Water Resources Div.
J. F. McCain, and P. O. Jefferson.
Alabama Geological Survey, University, May 129, 1972. 3 p, 3 ref.

Descriptors: *Available water, *Surface waters, *Streamflow, *Water quality, *Alabama, Flow rates, Water yield, Low flow, Hydrology, Rainfall-runoff relationships, Hydrologic data, Potential water supply, Maps, Bullock County(Ala).

Stream gaging by the U.S. Geological Survey was begun in Bullock County, Alabama, September 30, 1947, with the establishment of a low-flow partial-record station on Johnson Creek near Midway. The largest stream in the county is Pea River which has an average discharge of 145 million gallons per day at the southeast corner of the county. The surface-water availability map for Bullock County shows by width of color pattern the approximate long-term average flow, in million gallons per day, of streams in the county. The average flow from the county is about 0.80 million gallons per day per square mile. The chemical quality of water from streams in the county is relatively uniform and the water is suitable for most uses. The surface-water availability map shows the areal distribution of the sampling sites and the range of each chemical parameter determined at the site. (Woodard-USGS)
W78-03114

WATER AVAILABILITY AND GEOLOGY OF HALE COUNTY, ALABAMA,
Geological Survey, Tuscaloosa, AL. Water Resources Div.
M. E. Davis, T. H. Sanford, Jr., and P. O. Jefferson.
Alabama Geological Survey, University, Map 136, 1975. 51 p, 6 fig, 3 plates, 6 tab, 16 ref.

Descriptors: *Available water, *Surface waters, *Groundwater resources, *Water quality, *Alabama, Water yield, Streamflow, Water wells, Aquifers, Hydrologic budget, Hydrogeology, Well data, Chemical analysis, Potential water supply, Hydrologic data, Maps, Evaluation, Hale County(Ala).

Geologic units that underlie and crop out in Hale County, Alabama, include the Tuscaloosa Group, Eutaw Formation, and Selma Group of Late Cretaceous age, and terrace deposits and alluvium of Quaternary age. Potential sources of large supplies of ground water are major aquifers in the Coker, Gordo, and Eutaw Formations; expected yields are 1.5 mgd (million gallons per day) per well. The average annual runoff originating in Hale County is about 17 inches or 0.82 mgd per square mile. The Black Warrior River, largest potential source of surface water in the county, has an average flow of 5,800 mgd at the gaging station near Eutaw. Elliotts, Fivemile, Big Brush, and Big Prairie Creeks also are potential sources of surface water. These creeks have average flows ranging from 35 to 210 mgd. Water from most streams in the county contains less than 10 mg/liter chloride and ranges from soft to hard. The mineral content

of water from Big Brush Creek is affected by salty water from a flowing well. Ground water from the major aqifers contains less than 250 mg/liter chloride, except in the extreme northwestern and west-central parts of the county, and ranges from soft to very hard. Water from the aquifers generally contains iron in excess of 0.3 mg/liter except in the southern part of the county. Water use in Hale County in 1968 was about 3.9 mgd, most of which was ground water. Less than 1 percent of the potential water resources is being utilized. (Woodard-USGS)
W78-03115

WATER AVAILABILITY OF RANDOLPH COUNTY, ALABAMA,
Geological Survey, Tuscaloosa, AL. Water Resources Div.
G.C. Lines, and R. V. Chandler.
Alabama Geological Survey, University, Map 137, 1975. 29 p, 10 fig, 4 tab, 11 ref.

Descriptors: *Available water, *Surface waters, *Groundwater resources, *Water quality, *Alabama, Water yield, Streamflow, Water wells, Aquifers, Hydrologic budget, Hydrogeology, Well data, Chemical analysis, Potential water supply, Hydrologic data, Maps, Evaluation, *Randolph County(Ala).

Large quantities of surface water are available for use in Randolph County, Alabama. Supplies of 50 mgd (million gallons per day) or more are available from the Tallapoosa and Little Tallapoosa Rivers. Supplies of 2 mgd or more are available during most years without storage from 16 other streams throughout the county. Only small quantities of ground water are available from wells that penetrate igneous and metamorphic rocks in the county. Some wells may yield more than 100 gpm (gallons per minute), but most wells yield 15 gpm or less. Surface water in the county is of excellent chemical quality. Water in streams is soft and contains less than 50 mg/liter dissolved solids. Ground water is generally of good chemical quality and, except for excessive iron content in some areas, is suitable for most uses. Ground water is generally soft and rarely contains more than 200 mg/liter total dissolved solids. Total water use in Randolph County in 1969 was estimated to be about 1.4 mgd, which is less than 1 percent of the water available for use. Estimated surface-water withdrawal was about 590,000 gallons per day and estimated ground-water withdrawal was about 810,000 gallons per day. (Woodard-USGS)
W78-03116

WATER AVAILABILITY, ELMORE COUNTY, ALABAMA,
Geological Survey, Tuscaloosa, AL. Water Resources Div.
G.C. Lines.
Alabama Geological Survey, University, Map 138, 1975. 40 p, 6 fig, 2 plates, 5 tab, 10 ref.

Descriptors: *Available water, *Surface waters, *Groundwater resources, *Water quality, *Alabama, Water yield, Streamflow, Water wells, Aquifers, Hydrologic budget, Hydrogeology, Well data, Chemical analysis, Potential water supply, Hydrologic data, Maps, Evaluation, Elmore County(Ala).

Elmore County, in east-central Alabama, has large quantities of water of good chemical quality available from both surface-water and groundwater sources. The largest potential sources of water in the county are the Alabama, Coosa, and Tallapoosa River, which have average flows of 14,900 mgd (million gallons per day), 10,500 mgd, and 4,200 mgd, respectively. Seventeen smaller streams in the county have average flows of more than 10 mgd. Surface water in the county is of excellent chemical quality. The water is low in dissolved solids and not appreciably affected by industrial or domestic waste effluent. Large quantities of ground water (as much as 1.0 mgd per well) are available from individual wells tapping sand and gravelly sand beds in the Coker and Gordo Formations of Late Cretaceous age in the southwestern part of the county. Another potential source of large quantities of ground water is alluvium in the flood plains of the Alabama, Coosa, and Tallapoosa Rivers. Yields of wells that tap the Coker Formation in the west-central and southeastern parts of the county range from 0.1 to 0.5 mgd. Ground water in the county is of good chemical quality; however, the iron content is objectionable in some areas. (Woodard-USGS)
W78-03117

AVAILABILITY AND CHEMICAL CHARACTERISTICS OF GROUND WATER IN CENTRAL LA PLATA COUNTY, COLORADO,
Geological Survey, Lakewood, CO. Water Resources Div.
R. E. Brogden, and T. F. Giles.
Water-Resources Investigations 76-69 (open-file report), May 1976. 1 sheet, 14 ref.

Descriptors: *Groundwater resources, *Hydrogeology, *Aquifer characteristics, *Water yield, *Water quality, Water wells, Water utilization, Water supply, Chemical analysis, Groundwater movement, Groundwater availability, Colorado, Maps, La Plata County(Colo).

The central part of La Plata County, Colo., has undergone rapid population growth in recent years. This growth has resulted in an increased demand for information for additional domestic, industrial, and municipal water supplies. A knowledge of the occurrence of ground water will permit a more efficient allocation of the resource. Aquifers in central La Plata County include: alluvium, Animas Formation of Quaternary and Tertiary age, Fruitland Formation, Pictured Cliffs Sandstone, three formations of the Mesa Verde Group, the Mancos Shale, Dakota Sandstone, Morrison Formation of Cretaceous and Jurassic age, and undifferentiated formations. Well yields generally are low, usually less than 25 gallons per minute. However, higher yields, 25 to 50 gallons per minute may be found locally in aquifers in the alluvium and the Animas Formation. The quality of water from the aquifers is dependent on rock type. Most of the water is a calcium bicarbonate type. However, aquifers that are predominantly fine-grained or contain interbeds of shale may contain sodium bicarbonate type water. The dissolution of minerals in the coal beds, which are present in the Mesa Verde Group and the Dakota Sandstone, can contribute high concentrations of iron, sulfate, and chloride to ground water. (Woodard-USGS)
W78-03118

AVAILABILITY AND CHEMICAL QUALITY OF GROUND WATER IN THE CRYSTAL RIVER AND CATTLE CREEK DRAINAGE BASINS NEAR GLENWOOD SPRINGS, WEST-CENTRAL COLORADO,
Geological Survey, Lakewood, CO. Water Resources Div.
R. F. Brogden, and T. F. Giles.
Water-Resources Investigations 76-70 (open-file report), May 1976. 2 sheets, 16 ref.

Descriptors: *Groundwater resources, *Hydrogeology, *Aquifer characteristics, *Water yield, *Water quality, Water wells, Water utilization, Water supply, Chemical analysis, Groundwater movement, Groundwater availability, Colorado, Maps, West-central Colorado, *Glenwood Springs area(Colo).

Parts of the Crystal River and cattle Creek drainage basins near Glenwood Springs, Colo., have undergone rapid population growth in recent years. This growth has resulted in an increased demand for information for additional domestic, industrial, and municipal water supplies. A knowledge of the occurrence of ground water will permit a more efficient allocation of the resource. Aquifers in the two drainage basins include: alluvium, basalts, the Mesa Verde Formation, Mancos Shale, Dakota Sandstone, Morrison Formation, Entrada Sandstone, Maroon Formation, Eagle Valley Evaporite, and undifferentiated formations. Except for aquifers in the alluvium, and basalt, well yields are generally low and are less than 25 gallons per minute. Well yields form aquifers in the alluvium and basalt can be as much as several hundred gallons per minute. Water quality is dependent of rock type. Calcium bicarbonate is the predominant type of water in the study area. However, calcium sulfate type water may be found in aquifers in the Eagle Valley Evaporite and in the alluvium where the alluvial material has been derived from the Eagle Valley Evaporite. Concentrations of selenium in excess of U.S. Public Health Service standards for drinking water can be found locally in aquifers in the Eagle Valley Evaporite. (Woodard-USGS)
W78-03119

FLOODS IN OHIO--MAGNITUDE AND FREQUENCY,
Geological Survey, Columbus, OH. Water Resources Div.
For primary bibliographic entry see Field 2E.
W78-03120

WATER QUALITY OF SELECTED STREAMS IN THE COAL AREA OF SOUTHEASTERN MONTANA,
Geological Survey, Helena, MT. Water Resources Div.
For primary bibliographic entry see Field 5B.
W78-03121

WATER RESOURCES DATA FOR ALASKA, WATER YEAR 1976.
Geological Survey, Anchorage, AK. Water Resources Div.
Water-Data Report AK-76-1, September 1977. 401 p, 2 fig.

Descriptors: *Alaska, *Hydrologic data, *Surface waters, *Groundwater, *Water quality, Gaging stations, Streamflow, Flow rates, Sediment transport, Water analysis, Water temperature, Chemical analysis, Lakes, Reservoirs, Water wells, Water levels, Data collections, Sites.

Water resources data for the 1976 water year for Alaska consist of records of stage, discharge, and water quality of streams; stage and water quality of lakes; and water levels and water quality in wells and springs. This report contains discharge records for 102 gaging stations, stage only records for 2 gaging stations, water quality for 71 stations, and water levels for 24 observation wells. Also included are 91 crest-stage partial-record stations and 28 water-quality partial-record stations. Additional water data were collected at various sites, not part of the systematic data-collection program, and are published as miscellaneous measurements of discharge, lake stage, or water quality. These data represent that part of National Water Data System operated by the U.S. Geological Survey and cooperating State and Federal agencies in Alaska. (Woodard-USGS)
W78-03122

WATER RESOURCES DATA FOR ARIZONA, WATER YEAR 1976.
Geological Survey, Tucson, AZ. Water Resources Div.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-274 306, Price codes: A99 in paper copy, A01 in microfiche. Water-Data Report AZ-76-1, August 1977. 674, 7 fig, 1 tab.

Descriptors: *Arizona, *Hydrologic data, *Surface waters, *Groundwater, *Water quality,

Gaging stations, Streamflow, Flow rates, Sediment transport, Water analysis, Water temperature, Chemical analysis, Lakes, Reservoirs, Water wells, Water levels, Data collections, Sites.

Water resources data for 1976 water year for Arizona consist of records of stage, discharge, and water quality of streams; stage, contents, and water quality of lakes and reservoirs; and water levels of observation wells. This report contains discharge records for 237 gaging stations, 81 crest-stage partial-record stations, and discharge measurements at 48 miscellaneous sites; stage records at 3 gaging stations; stage and contents records for 10 lakes and reservoirs; 15 supplementary records, included with gaging-station records, consisting of monthend or monthly stage, contents, and evaporation of lakes and reservoirs, diversions, and return flow; water-quality records for 69 continuous-record stations, 5 partial-record stations, and 46 miscellaneous sites; and water levels for 89 observation wells. These data represent that part of the National Water Data System operated by the U.S. Geological Survey and cooperating Federal and State agencies of Arizona. (Woodard-USGS)
W78-03123

RISING GROUND-WATER LEVEL IN DOWNTOWN LOUISVILLE, KENTUCKY, 1972-1977,
Geological Survey, Louisville, KY. Water Resources Div.
For primary bibliographic entry see Field 4B.
W78-03124

GROUND-WATER RESOURCES OF DESOTO AND HARDEE COUNTIES, FLORIDA,
Geological Survey, Tallahassee, FL. Water Resources Div.
For primary bibliographic entry see Field 4B.
W78-03125

WATER QUALITY OF TAMPA BAY, FLORIDA: WET-WEATHER CONDITIONS, OCTOBER 1971,
Geological Survey, Tampa, FL. Water Resources Div.; and Geological Survey, Lawrence, KS. Water Resources Div.
For primary bibliographic entry see Field 5A.
W78-03128

GEOLOGY AND GROUND WATER IN WESTERN SANTA CRUZ COUNTY, CALIFORNIA, WITH PARTICULAR EMPHASIS ON THE SANTA MARGARITA SANDSTONE,
Geological Survey, Menlo Park, CA. Water Resources Div.
J. P. Akers, and L. E. Jackson Jr.
Water-Resources Investigations 77-15 (open-file report), July 1977. 4 fig, 3 tab, 13 ref.

Descriptors: *Groundwater potential, *Aquifer characteristics, *Groundwater availability, *Water quality, California, Hydrogeology, Test wells, Evaluation, Saline water intrusion, Santa Cruz County(Calif), Santa Margarita sandstone.

The water-bearing potential of the geologic formations in the western part of Santa Cruz County, Calif., is evaluated. Most of the sedimentary formations in this area are fine-grained rocks of Tertiary age that have been folded and faulted. These rocks, in general, yield supplies of water sufficient only for individual domestic supplies. The Lompico and Santa Margarita Sandstones, however, are coarser grained and have the potential to yield moderate quantities of water (50-100 gallons per minute). Areas where the Lompico Sandstone might warrant explorations are (1) near and on the west side of the Ben Lomond fault, (2) near and south of the outcrop of the Lompico Sandstone between Ben Lomond and Felton, and (3) in the area near Bald Mountain School. The Santa Margarita Sandstone should be explored by test drilling in the area between Davenport and Bonnie Doon. The quality of ground water is generally good, although saline water occurs in the San Lorenzo Formation near Redwood Grove and Riverside Grove. (Woodard-USGS)
W78-03129

COMPUTER SIMULATION OF TWO-DIMENSIONAL UNSTEADY FLOWS IN ESTUARIES AND EMBAYMENTS BY THE METHOD OF CHARACTERISTICS--BASIC THEORY AND THE FORMULATION OF THE NUMERICAL METHOD,
Geological Survey, Reston, VA. Water Resources Div.
For primary bibliographic entry see Field 2L.
W78-03130

DRAINAGE AREAS OF THE GUYANDOTTE RIVER BASIN, WEST VIRGINIA,
Geological Survey, Charleston, WV. Water Resources Div.
M. V. Mathes, Jr.
Open-file report 77-801, September 1977. 56 p, 1 fig, 1 tab.

Descriptors: *River basins, *Drainage area, *West Virginia, Reach(Streams), Sites, Watersheds(Basins), *Guyandotte River basin(W Va).

This report, prepared in cooperation with the West Virginia Office of Federal-State Relations (now the Office of Economic and Community Development), lists in tabular form 435 drainage areas for basins within the Guyandotte River basin of West Virginia. Drainage areas are compiled for sites at the mouths of all streams having drainage areas of approximately five square miles or greater, for sites at U.S. Geological Survey gaging stations (past and present), and for other miscellaneous sites. (Woodard-USGS)
W78-03135

8. ENGINEERING WORKS

8A. Structures

IMPERIAL BEACH, CALIFORNIA, DESIGN OF STRUCTURES FOR BEACH EROSION CONTROL; HYDRAULIC MODEL INVESTIGATION,
Army Engineer Waterways Experiment Station, Vicksburg, MS.
For primary bibliographic entry see Field 8B.
W78-02768

NAVIGATION CONDITIONS AT COLUMBUS LOCK AND DAM, TOMBIGBEE RIVER, MISSISSIPPI AND ALABAMA,
Army Engineer Waterways Experiment Station, Vicksburg, MS.
For primary bibliographic entry see Field 8B.
W78-02781

QUEUING MODELS FOR MULTIPLE CHAMBER LOCKS,
California Univ., Berkeley. Operations Research Center.
C. R. Glassey, and S. M. Ross.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A030 767, Price codes: A03 in paper copy, A01 in microfiche. Report ORC 76-27, September 1976. 31 p, 1 fig, 4 tab, 6 ref, 1 append. Submitted to Army Research Office, Triangle Park, N.C. ARO DAAG29-76-G-0042.

Descriptors: *Rivers, *Locks, *Navigation, *Model studies, *Mississippi River, Mathematical models, Queueing theory, Barges, Management, Optimization, Operations, *Waterway locks, Lock operation, Queueing models.

Several models for predicting mean waiting times of river traffic at a multiple chamber lock were developed and tested. Mean waiting times predicted by the M/G/1 model differed significantly from observed times. Analysis of possible causes of failure of this model suggested a limited queue length M/G/1 model for one chamber, from which more accurate predictions were derived. For the two-chamber system and M/G/1 model with random batch size was developed. This model yields a lower bound for mean waiting time. These last two models can be used to predict system performance under various operating conditions. (Sims-ISWS)
W78-02817

FLOOD CONTROL SYSTEM FOR A DAM,
Hitachi Ltd. (Japan). (Assignee).
K. Matsumoto, J. Hatakeyama, and M. Okamoto.
U.S. Patent No 4,036,023, 12 p, 8 fig, 1 tab, 7 ref; Official Gazette of the United States Patent Office, Vol 960, No 3, p 1030, July 19, 1977.

Descriptors: *Patents, *Control systems, *Flood control, Dams, *Water level fluctuations, Flow control, Water levels.

A flood control system for a dam is capable of promptly reacting so as to maintain the water level of the dam within a predetermined range. It is also capable of accurately controlling the water level of a dam. The invention is characterized by providing a system comprising means for setting a reference water level for the dam, means for measuring the actual water level of the dam, means for calculating the deviation between the reference water level and the actual water level, means for effecting proportional-position control which generates a first control signal proportional to the measured deviation, integration means for generating a second control signal corresponding to the integration result of the measured deviation, differentiation means for generating a third control signal corresponding to the differentiation result of the inflow determined by the measured deviation, means for calculating the outflow to be discharged in response to the sum of the first, second, and third control signals, and means for calculating the angle of gate to produce the required outflow. (Sinha-OEIS)
W78-02905

UNDERWATER ANCHORING APPARATUS,
Department of Industry, London (England). (Assignee).
R. A. Nixon.
U.S. Patent No. 4,036,161, 4 p, 4 fig, 3 ref; Official Gazette of the United States Patent Office, Vol 960, No 3, p 1076, July 19, 1977.

Descriptors: *Patents, *Structures, *Anchors, Underwater, Suspended solids, Underwater anchoring structures.

An apparatus for establishing an anchorage in a body of water comprises essentially a substantially hollow structure into which solids from the body of water are induced as solids in liquid suspension. When the apparatus is being used as an anchoring device the design is such that as solids from the body of water are induced into the hollow structure they fill or partially fill the structure which then proceeds to bury itself into the bed of the body of water thereby establishing an anchorage. The hollow structure includes a lower platform region with a series of intake passageways arranged so that solids are induced into the structure. A vent passageway acts as an air-lift pump for the extraction of air/water form within the interior of the structure. (Sinha-OEIS)
W78-02906

8B. Hydraulics

GUIDELINES FOR MONITORING AND REPORTING DEMONSTRATION PROJECTS; SECTION 32 PROGRAM, STREAMBANK EROSION CONTROL EVALUATION AND DEMONSTRATION ACT OF 1974,
Army Engineer Waterways Experiment Station, Vicksburg, MS.
For primary bibliographic entry see Field 4D.
W78-02754

EFFECT OF LOSS OF VALLEY STORAGE IN THE CANNELTON POOL ON OHIO RIVER FLOOD HEIGHTS,
Army Engineer Waterways Experiment Station, Vicksburg, MS.
B. H. Johnson, and P. K. Senter.
Available from the National Technical Information Service, Springfield, VA 22161 as ADA-041 670, Price codes: A03 in paper copy, A01 in microfiche. Miscellaneous Paper H-77-7, June 1977. 33 p, 6 fig, 4 tab, 9 pl, 5 ref.

Descriptors: *Mathematical models, *Flood control, Flood waves, *Ohio River, *Open channel flow, *Storage coefficient, *Valleys, *Cannelton Pool(Ohio).

A mathematical model called SOCHMJ (Simulation of Open Channel Hydraulics in Multi-Junction Systems) has been employed to determine the effect of valley storage loss in the Cannelton Pool on flood heights along the Ohio River. Three levels of storage loss have been investigated. The first level was the complete removal of valley storage and was accomplished by assuming the placement of levees along the banks throughout the Cannelton Pool. The second level of storage loss was arrived at through the placement of levees halfway from the bank to the maximum lateral encroachment of the 1945 flood throughout the Cannelton Pool. The third level consisted of assuming levees along the bank of the lower 58 miles of the Cannelton Pool. It was concluded from the model results that neither a complete loss of valley storage nor substantial variation of Manning's n in the Cannelton Pool appreciably influenced flood heights as far downstream as Evansville, Indiana. (WES)
W78-02760

PRESSURE TESTS IN FLOOD-CONTROL CONDUIT, MELVERN DAM, KANSAS,
Army Engineer Waterways Experiment Station, Vicksburg, MS.
T. L. Fagerburg.
Available from the National Technical Information Service, Springfield, VA 22161 as ADA-041 291, Price codes: A03 in paper copy, A01 in microfiche. Miscellaneous Paper H-77-5, May 1977. 28 p, 7 fig, 6 pl, 5 ref, append.

Descriptors: *Conduits, *Flood control, Pressure, *Prototype tests, Kansas, Dams, Testing, *Melvern Dam(Kan).

Prototype tests were conducted at Melvern Dam, Kansas, to determine pressures on the flood-control conduit walls and to obtain the hydraulic (piezometric) grade lines of the system. No critical pressures were observed during the operation of the tests. Resistance coefficients and intake losses were also obtained. The findings were comparable to those obtained from tests at similar projects. (WES)
W78-02762

A NUMERICAL HINDCAST MODEL FOR WAVE SPECTRA ON WATER BODIES WITH IRREGULAR SHORELINE GEOMETRY; REPORT 1, TEST OF NONDIMENSIONAL GROWTH RATES,
Army Engineer Waterways Experiment Station, Vicksburg, MS.
D. T. Resio, and C. L. Vincent.
Available from the National Technical Information Service, Springfield, VA 22161 as ADA-044 051, Price codes: A04 in paper copy, A01 in microfiche. Miscellaneous Paper H-77-9, August 1977 (Report 1 of a series). 53 p, 13 fig, 41 ref.

Descriptors: *Mathematical models, *Waves(Water), *Growth rates, Model studies, *Water wave generation.

These results indicate that growth with fetch in the present model is much closer than those of previous numerical models to the observed in recent field experiments. The growth with nondimensional time is much mofe difficult to assess, but the proposed model appears to give reasonable results for these situations as well. Report 2 of this series will document an extensive set of ral-time tests of the new model at several gage sites on the Great Lakes. A numerical model for wave generation in water bodies of arbitrary shape is described. The new model is a variation of a model previously developed by Barnett (1968). Important differences are the numerical technique, slightly modified source terms and the incorporation of a variable equilibrium range of spectral density. Results for ideal, homogeneous generation situations for growth with nondimensional time and nondimensional duration are examined and compared to those from some previous models. (WES)
W78-02764

DETAILED DESIGN FOR DYKE MARSH DEMONSTRATION AREA, POTOMAC RIVER, VIRGINIA,
Army Engineer Waterways Experiment Station, Vicksburg, MS.
M. R. Palermo, and T. W. Ziegler.
Technical Report D-77-13, October 1977. 217 p, 24 fig, 2 tab, 14 ref, 5 append.

Descriptors: *Potomac River, *Marshes, Virginia, Design criteria, Design, Dredging, Sediments, *Dredged material.

Results of detailed engineering studies regarding use of dredged material to expand an existing marshland area are presented. Sampling and testing programs are described that allowed determination of the suitability of channel sediment for use as marsh substrate. Foundation studies indicated conditions at the demonstration site are adequate for construction of a containment facility. A methodology for correlation of in situ channel sediment volume and containment area volume is presented. The methodology incorporates basic principles of containment area volumetric sizing and accounts for consolidation of the newly placed marsh substrate. Laboratory tests using a full height column were performed to simulate the sedimentation phase of the dredging process. Conventional consolidation tests were then performed on samples taken from the column for evaluation of the consolidation phase. Evaluations were made regarding containment sizing for retention of suspended solids, containment area operation, and procedures for placement of dredged material. (WES)
W78-02765

GEOMETRIC PARAMETERS THAT INFLUENCE FLOODPLAIN FLOW,
Army Engineer Waterways Experiment Station, Vicksburg, MS.
M. James, and B. J. Brown.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A041 641, Price codes: A07 in paper copy, A01 in microfiche. Research Report H-77-1, June 1977. 141 p, 9 fig, 1 tab, 8 photo, 30 pl, 3 append, 10 ref.

Descriptors: *Flood plains, *Overflow, Testing, *Laboratory tests, Flumes, Channel flow, Resistance, *Resistance coefficient.

Laboratory tests were conducted in a tilting flume to study the effects of overbank flow on the resistance coefficient. Testing was accomplished on a straight and meandering main channel for a symmetrical and asymmetrical floodplain of various widths. Results indicated that a correction must be applied to the resistance formula for shallow-flow depths over the overbank, and the correction factors are presented graphically. (WES)
W78-02767

IMPERIAL BEACH, CALIFORNIA, DESIGN OF STRUCTURES FOR BEACH EROSION CONTROL; HYDRAULIC MODEL INVESTIGATION,
Army Engineer Waterways Experiment Station, Vicksburg, MS.
C. R. Curren, and C. E. Chatham.
Available from the National Technical Information Service, Springfield, VA 22161 as ADA-044 108, Price codes: A08 in paper copy, A01 in microfiche. Technical Report H-77-15, August 1977. 157 p, 12 tab, 88 photo, 12 pl, 16 ref.

Descriptors: *Beach erosion, *Breakwaters, Erosion control, Groins(Structures), *Hydraulic models, Waves(Water), California, *Imperial Beach(Calif).

A 1:75-scale (undistorted) hydraulic model, reproducing approximately 2.6 miles of shoreline and sufficient offshore area to permit generation of the required test waves, was used to investigate the arrangement and design of alternative proposed structures for prevention of erosion of the Imperial Beach shoreline. Several conclusions from model test results were: (1). Existing conditions are characterized by strong rip currents and longshore currents for most wave conditions with considerable onshore-offshore movement of sand. (2). The original improvement plan for Imperial Beach (i.e., the authorized five-groin plan) is ineffective in trapping tracer material and, in fact, contributes to the offshore movement.(3). The originally proposed breakwater plan (Plan 1) is not adequate for full protection of the beach. Raising the crown elevation of the Plan 1 structure to a sufficient height will make this plan effective from a functional standpoint; however, a substantial cost increase results due to greatly increased volume of rock required. (WES)
W78-02768

DESIGN WAVE INFORMATION FOR THE GREAT LAKES; REPORT 4, LAKE HURON,
Army Engineer Waterways Experiment Station, Vicksburg, MS.
D. T. Resio, and C. L. Vincent.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A046 414, Price codes: A08 in paper copy, A01 in microfiche. Technical Report H-76-1, September 1977 (Report 4 of a series). 153 p, 22 fig, 9 tab, 6 append, 65 ref.

Descriptors: Great Lakes, *Lake Huron, *Waves(Water), Design criteria, Winds, Data collections, *Design wave.

This report contains hindcast wave information that is applicable to many planning and design purposes on Lake Huron. Historical wind data from stations along Lake Huron served as input to the numerical hindcast model, and significant wave heights were calculated for 5-, 10-, 20-, 50-, and 100-yr return periods. These results are provided in tabular form for 28 points along the Lake Huron shoreline. The mean significant period for each of these wave heights is also given. Information is provided for four seasons of the year (January-March, April-June, July-September, and October-December) and is separated into three approach directions relative to shore. (WES)
W78-02769

TSUNAMI-WAVE ELEVATION FREQUENCY OF OCCURRENCE FOR THE HAWAIIAN ISLANDS,
Army Engineer Waterways Experiment Station, Vicksburg, MS.
J. R. Houston, R. D. Carver, and D. G. Markle.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A045 023, Price codes: A06 in paper copy, A01 in microfiche. Technical Report H-77-16, August 1977. 109 p, 14 fig, 1 tab, 44 pl, 1 append, 41 ref.

Descriptors: *Finite element analysis, *Flood frequencies, *Hawaii, *Mathematical models, *Tsunamis.

An investigation was undertaken to establish frequency-of-occurrence curves for tsunami-wave elevations near the shoreline for the Hawaiian Islands. A hybrid finite element numerical model was used to supplement historical data in determining the ten largest tsunami elevations from 1837 to 1976 at locations along the coastline of the islands. The numerical model was verified by comparing tide gage recordings at various locations in the Hawaiian Islands during the 1960 and 1964 tsunamis with numerical model calculations. Frequency-of-occurrence curves were established using data from the ten largest tsunami-wave elevations along the Hawaiian coastline. Figures and the table presented in the report can be used to calculate tsunami elevations 200 ft shoreward of the coastline of the Hawaiian Islands (except the coast of the uninhabited U.S. Navy target island of Kahoolawe). Runup nearly equals tsunami elevation at the shoreline for some of the coastline of the islands, but not for areas where flooding is substantial. A recommendation is given for development of a method to calculate land flooding during a tsunami. (WES)
W78-02770

REAERATION TESTS, OUTLET WORKS, BELTZVILLE, DAM, POHOPOCO CREEK, PENNSYLVANIA,
Army Engineer Waterways Experiment Station, Vicksburg, MS.
For primary bibliographic entry see Field 5G.
W78-02771

POWERHOUSE INTAKE GATE CATAPULT STUDY, BIG BEND DAM, SOUTH DAKOTA, AND STOCKTON, HARRY S. TRUMAN, AND CLARENCE CANNON DAMS, MISSOURI: HYDRAULIC MODEL INVESTIGATION,
Army Engineer Waterways Experiment Station, Vicksburg, MS.
For primary bibliographic entry see Field 8C.
W78-02772

MARYSVILLE LAKE HYDROTHERMAL STUDY; REPORT 1, 900-MW PROJECT; HYDRAULIC AND MATHEMATICAL MODEL INVESTIGATION,
Army Engineer Waterways Experiment Station, Vicksburg, MS.
D. G. Fontane, M. S. Dortch, C. H. Tate, and B. Loftis.
Available from the National Technical Information Service, Springfield, VA 22161 as ADA-042 556, Price codes: A06 in paper copy, A01 in microfiche. Technical Report H-77-5, April 1977 (report 1 of a series). 76 p, 7 fig, 2 tab, 12 pl, 8 ref, 2 append.

Descriptors: *Hydraulic models, *Mathematical models, *Pumped storage, *Water temperature, California, Lakes, Pre-impoundment, *Marysville Lake(Calif).

This study was conducted to determine if the proposed Marysville Lake pumped-storage hydropower (900-MW) project could satisfy downstream water temperature objectives. A one-dimensional numerical model was used for simulation and prediction of temperatures within and downstream of Marysville Lake. A physical hydraulic model was used for study and description of the hydrodynamic response of the project to pumped-storage hydropower operations. The physical model, constructed to a distorted scale of 1:1600 horizontally and 1:160 vertically, simulated the dynamic, unsteady-stage, density-stratified flows through Marysville Lake and the afterbay or reregulating pool. Information from the physical model was used to modify existing algorithms and to develop new ones for the mathematical model. (WES)
W78-02773

MATHEMATICAL MODEL OF ESTUARIAL SEDIMENT TRANSPORT,
California Univ., Davis. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2L.
W78-02774

PUMPING STATIONS FOR DRAINAGE DISTRICT NO. 17, MISSISSIPPI COUNTY, ARKANSAS; HYDRAULIC MODEL INVESTIGATION,
Army Engineer Waterways Experiment Station, Vicksburg, MS.
For primary bibliographic entry see Field 8C.
W78-02775

RED RIVER WATERWAY, LA., TEX., ARK., AND OKLA., MISSISSIPPI RIVER TO SHREVEPORT, LA., REACH, LOCK AND DAM NO. 1; HYDRAULIC MODEL INVESTIGATION,
Army Engineer Waterways Experiment Station, Vicksburg, MS.
N. R. Oswalt.
Available from the National Technical Information Service, Springfield, VA 22161 as ADA-041 642, Price codes: A04 in paper copy, A01 in microfiche. Technical Report H-77-13, June 1977. 60 p, 6 fig, 2 tab, 14 photo, 21 pl.

Descriptors: *Hydraulic models, *Riprap, *Spillways, *Stilling basins, Louisiana, *Red River Waterway(La).

Tests were conducted on a 1:36-scale model of the Red River Spillway No. 1 to develop a conventional jump-type stilling basin and plans of riprap that would provide adequate protection of the approach and exit channels for emergency (single-gated flows) and normal operating conditions. During the course of study, approac:. elevations of 6, 8, and 11 ft were tested to reveal the effects on the spillway efficiency and tests were conducted with runaway barges to determine if a loose barge loaded to a 9-ft draft could be flushed through the stilling basins. Tests to determine the minimum riprap protection for the exit channel bottom indicated a 300-ft length of protection is required downstream of the basin. A series of tests to determine discharge characteristics revealed that data from a previous model investigation could be used to obtain the discharge coefficients of the Red River spillways, and comparison plots are provided in this report. (WES)
W78-02778

SPILLWAY VIBRATION, PRESSURE, AND VELOCITY MEASUREMENTS, OZARK LOCK AND DAM, ARKANSAS RIVER, ARKANSAS,
Army Engineer Waterways Experiment Station, Vicksburg, MS.
C. A. Pugh.
Available from the National Technical Information Service, Springfield, VA 22161 as ADA-040 132, Price codes: A04 in paper copy, A01 in microfiche. Technical Report H-77-6, April 1977. 51 p, 16 fig, 3 tab, 15 pl, 10 ref, append.

Descriptors: Overflow, *Spillways, *Vibrations, Velocity, Measurement, Pressure, Arkansas, *Arkansas River, Gate vibration, *Ozark Lock and Dam(Ark).

Tests were conducted in bay 8 of the low-overflow spillway at Ozark Dam, Arkansas River, Arkansas, in September 1974 to study vibrations and pressure fluctuations as related to flow through the spillway. Pressures were measured on the spillway sill to determine whether fluctuations are correlated with structural vibrations. Velocity distributions were measured to study boundary layer development and to determine an equivalent roughness for the spillway surface. Gate vibrations were measured to attempt to confirm model results. Pressure fluctuations on the low overflow spillway did not exhibit a root-mean-square (RMS) value large enough to be considered as a source of excitation of spillway vibration. The structure appeared to be vibrating at a natural frequency of 2.7 cps. Structural vibration amplitude was relatively small. Gate vibrations appeared to be independent of opening. The equivalent sand grain roughness Ks determined for the Ozark spillway (0.0061 ft) supplements previous data. Theoretical boundary layer thicknesses agree with the measured velocity profiles. (WES)
W78-02779

WATER-QUALITY EVALUATION OF A LOWER POOL ELEVATION FOR PROPOSED ARCADIA LAKE, OKLAHOMA,
Army Engineer Waterways Experiment Station, Vicksburg, MS.
For primary bibliographic entry see Field 5A.
W78-02780

NAVIGATION CONDITIONS AT COLUMBUS LOCK AND DAM, TOMBIGBEE RIVER, MISSISSIPPI AND ALABAMA,
Army Engineer Waterways Experiment Station, Vicksburg, MS.
J. J. Franco, and L. J. Shows.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A042 027, Price codes: A00 in paper copy, A01 in microfiche. Technical Report H-77-11, May 1977. 83 p, 14 fig, 9 tab, 10 photo, 28 pl.

Descriptors: *Hydraulic models, *Locks, Alabama, Mississippi, Navigation, *Columbus Lock and Dam(Ala), *Navigation conditions, *Tombigbee River(Miss).

The Columbus Lock and Dam will be the third navigation structure proposed as part of the development of the Tennessee-Tombigbee Waterway for navigation. The structure will be located in a bypass canal about 370 miles above the mouth of the Mobile River at the foot of Government Street in Mobile, Alabama, or just downstream from the confluence of the Tombigbee and Tibbee Rivers and about 4 miles northwest of Columbus in Lowndes County, Mississippi. The structure is designed to maintain a minimum upper pool during low flows extending upstream to the proposed Aberdeen Lock and Dam at mile 408 and will include one lock with clear chamber dimensions of 110 by 600 ft, a five-gate spillway section of the dam located in the bypass canal on the left overbank, and a fixed overflow section along the left overbank to high ground. A fixed-bed model reproducing about 4.5 miles of the Tombigbee River channel, upper and lower lock approaches, the lock approach canal, and the adjacent overbank areas to an undistorted scale of 1:120 was used to determine the adequacy of the proposed plan and to develop modifications required to eliminate any adverse conditions indicated. (WES)
W78-02781

TOPOLOGICAL PROPERTIES OF SOME TRELLIS PATTERN CHANNEL NETWORKS,
Cold Regions Research and Engineering Lab., Hanover, NH.
S. J. Mock.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A034 824, Price codes: A04 in paper copy, A01 in

microfiche. CRREL Report 76-46, December 1976. 54 p, 17 fig, 35 tab, 27 ref, 1 append.

Descriptors: *Geologic control, *Networks, Hydrology, *Trellis, *River systems, Streams, Channels, Analysis, River basins, Channel morphology, *Stream order, *Stream magnitude, River basin morphology.

The topological properties of ten stream networks were analyzed and compared with those predicted by the topologically random model. The topologically random model states that, in the absence of geological controls, all topologically distinct channel networks having the same number of sources are equally likely, and, in an infinite topologically random network, all topologically distinct sub-networks occur with equal frequency. The ten stream networks have moderately- to well-developed trellis drainage patterns which have formed in response to differential erosion acting on sequences of folded and tilted sedimentary rocks. Testing procedures included examining the frequency of occurrence of topologically distinct channel networks, ambilateral classes, and sets of Strahler stream numbers for sub-networks up to magnitude 10. Deviations from predictions of the topologically random model occur in the magnitude-4 networks and are attributed to preferential development of minor tributaries flowing in the down-dip direction of the local rocks. The only other deviation from predicted frequencies occurs in the magnitude-10 stream number sets and is not obviously explicable as a response to geologic controls. The observed departures from the expectations of a topologically random model are related to geological factors, but the deviations are subtle and not observed in the streams having less well developed trellis patterns. The topologically random model serves as a very useful standard with which to compare real channel networks. Also, the presence of strong geological controls, which affect the channel network patterns, has only minor effects on the topological properties. (Adams-ISWS)
W78-02818

WAVE MOTOR COMPRISED OF A SUBMERGED FLOATING NETWORK OF CHAMBERS FORMED BY WALLS PERMITTING VARIABLE GEOMETRY,
R. E. A. Tornkvist.
U.S. Patent No 4,036,563, 9 p, 12 fig, 6 ref; Official Gazette of the United States Patent Office, Vol 960, No 3, p 1214, July 19, 1977.

Descriptors: *Patents, *Waves(Water), Ocean waves, *Energy, *Energy conversion, Shore protection, Breakwaters, Deformation, Electrical equipment.

A wave energy transformer makes it possible to obtain the primary power out of a wave movement by braking the water masses over wave width and down to a certain depth so that the water particles are substantially still after the transformer. This is achieved by means of a wave energy transformer which is characterized in that the transformer of an in and under water floating space network of chambers filled with water and constituted by walls whose dimensions and/or shape can be deformed and which are pivotally connected to each other, and that at least two of the deformable walls in each chamber are connected to at least one pumping means. The invention is based on the idea that the chambers of the network are made of mutually pivoted deformable walls, and the deformations of the chamber walls produced by the waves are successively braked by a system of pump cylinders which produce a water pressure in the pipe system. The water pressure is utilized for the operation of water turbines for the production of electric current or for other use. One purpose of the invention is to produce a breakwater which is generally independent from stationary underwater constructions and that is based on the reduction in wave energy due to the effect of the transformer. (Sinha-OEIS)
W78-02909

RESONANT SCATTERING BY A HARBOR WITH TWO COUPLED BASINS,
Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.
C. C. Mei, and U. Unluata.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A038 025, Price codes: A02 in paper copy, A01 in microfiche. Reprinted from: Journal of Engineering Mathematics, Vol 10, No 4, p 333-353, October 1976. 6 fig, 19 ref. ONR- N00014-76-C-0214.

Descriptors: *Harbors, *Estuaries, Waves(Water), *Incident waves, *Resonant scattering, Scattering, Harbor oscillations.

A harbor with two coupled rectangular basins is subjected to periodic incident waves. Ignoring friction the scattering problem is solved by the method of matched asymptotics for narrow junctions. The example of two identical basins is analyzed in detail for the resonant spectrum and response. It is shown that for certain modes the inner basin is less shielded. (Sinha-OEIS)
W78-03088

HYDRAULIC ANALYSIS, MAD RIVER AT STATE HIGHWAY 41, SPRINGFIELD, OHIO,
Geological Survey, Columbus, OH. Water Resources Div.
For primary bibliographic entry see Field 4C.
W78-03134

ANALYSIS OF RUNOFF FROM SMALL DRAINAGE BASINS IN WYOMING,
Geological Survey, Cheyenne, WY. Water Resources Div.
For primary bibliographic entry see Field 2E.
W78-03137

8C. Hydraulic Machinery

TRANSMISSION LINE RIGHTS-OF-WAY MANAGEMENT,
Mississippi State Univ., Mississippi State. Dept. of Wildlife and Fisheries.
For primary bibliographic entry see Field 6B.
W78-02730

POWERHOUSE INTAKE GATE CATAPULT STUDY, BIG BEND DAM, SOUTH DAKOTA, AND STOCKTON, HARRY S. TRUMAN, AND CLARENCE CANNON DAMS, MISSOURI: HYDRAULIC MODEL INVESTIGATION,
Army Engineer Waterways Experiment Station, Vicksburg, MS.
J. F. George, and G. A. Pickering.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A043 876, Price codes: A05 in paper copy, A01 in microfiche. Technical Report H-77-8, April 1977. 72 p, 11 tab, 32 pl.

Descriptors: *Electric powerplants, *Gates, *Hydraulic structures, *Intake structures, South Dakota, Missouri, *Big Bend Dam(SD), *Stockton Dam(Mo), *Clarence Cannon Dam(Mo), *Harry S. Truman Dam(Mo).

Tests were conducted to determine the range of gate openings and hydraulic conditions at which the service gates at Big Bend, Stockton, and Clarence Cannon powerhouses can be used for watering-up the scroll case area. The test data should also be applicable to Harry S. Truman powerhouse. Measurements of gate catapult heights, uplift forces, discharge coefficients, and pressures throughout the system were made for various gate openings and pool elevations. The discharge coefficients that were measured for flow underneath the gate were about as expected. However, the discharge coefficients for the back-of-gate orifices were considerably higher than had been expected. The back-of-gate orifice is actually a submerged, vertical short tube. There is not a plentiful supply of data concerning discharge coefficients for a vertical orifice, but the limited amount of information that is available indicates that the coefficients determined in this study are not unreasonable.
W78-02772

PUMPING STATIONS FOR DRAINAGE DISTRICT NO. 17, MISSISSIPPI COUNTY, ARKANSAS; HYDRAULIC MODEL INVESTIGATION,
Army Engineer Waterways Experiment Station, Vicksburg, MS.
P. E. Saunders.
Available from the National Technical Information Service, Springfield, VA 22161 as ADA-042 892, Price codes: A04 in paper copy, A01 in microfiche. Technical Report H-77-12, May 1977. 50 p, 1 tab, 8 photo, 13 pl, 13 ref.

Descriptors: *Hydraulic models, *Pumping plants, *Open channel flow, *Vortices, Arkansas, Model studies.

This report describes a hydraulic model investigation of an existing pumping station and a 700-cfs-capacity pumping station proposed to provide additional flood protection for Drainage District No. 17, Mississippi County, Arkansas. A 1:12-scale model the proposed pumping station, the existing pumping station, and the approach channel was used to determine flow patterns and velocities in the approach channel and to determine pressure fluctuations and vortex action within the pump sumps of the proposed station. The model investigation indicated a large eddy in the approach channel that caused air-entraining vortexes within the sumps and large pressure fluctuations at the pump intakes. These problems were relieved by adding an earth berm separating the two stations, round pier noses, and cylindrical quadrant walls at the proposed station, by raising the baffle wall behind the pumps at the proposed station, and by adding transverse, vertical baffle walls within the sumps in the proposed station. (WES)
W78-02775

SPILLWAY VIBRATION, PRESSURE, AND VELOCITY MEASUREMENTS, OZARK LOCK AND DAM, ARKANSAS RIVER, ARKANSAS,
Army Engineer Waterways Experiment Station, Vicksburg, MS.
For primary bibliographic entry see Field 8B.
W78-02779

CONSTRUCTION AND LAUNCH BARGE AND METHOD OF PRODUCING AND INSTALLING OFFSHORE STRUCTURES,
Lin Offshore Engineering, Inc., San Francisco, CA. (Assignee).
P. Y. Chow.
U.S. Patent No. 4,015,554, 11 p, 15 fig, 4 ref; Official Gazette of the United States Patent Office, Vol 957, No 1, p 95, April 5, 1977.

Descriptors: *Patents, *Engineering structures, *Offshore platforms, Coasts, Concrete structures, Barges, Construction, Construction equipment.

A major concrete offshore structure may be constructed directly on a barge embodying this invention and then later transported to the operating site and launched, without the offshore structure having to leave this construction vessel until the moment is is actually launched. The barge serves as a shallow draft construction dock, as a barge for transporting the object to be constructed to the operating site, and also as a mechanism for launching the offshore structure by submerging the barge and then moving it out from beneath the offshore structure. The barge, made of steel or of

prestressed concrete, has ballast compartments below deck level, the offshore structure being constructed on the deck level, and the ballast compartment is equipped with control for both ballasting and blowing the tanks. Column stabilizers and their location close to the corners of the barge provide the heavily loaded barge with the needed stability when the barge is completely submerged. The column stabilizers must be of sufficient area and height and must be so located that the metacenter of the barge, plus its load and its ballast, is maintained above the center of gravity at all times, thereby insuring the needed stability, during towing, construction, and launching. (Sinha-OEIS)
W78-02891

ADJUSTABLE FLOW FLOATING WEIR ASSEMBLY,
For primary bibliographic entry see Field 5D.
W78-02892

WATER SCREEN,
For primary bibliographic entry see Field 3F.
W78-02896

WAVE MOTOR COMPRISED OF A SUBMERGED FLOATING NETWORK OF CHAMBERS FORMED BY WALLS PERMITTING VARIABLE GEOMETRY,
For primary bibliographic entry see Field 8B.
W78-02909

8D. Soil Mechanics

RED RIVER WATERWAY, LA., TEX., ARK., AND OKLA., MISSISSIPPI RIVER TO SHREVEPORT, LA., REACH, LOCK AND DAM NO. 1; HYDRAULIC MODEL INVESTIGATION,
Army Engineer Waterways Experiment Station, Vicksburg, MS.
For primary bibliographic entry see Field 8B.
W78-02778

8F. Concrete

CONSTRUCTION AND LAUNCH BARGE AND METHOD OF PRODUCING AND INSTALLING OFFSHORE STRUCTURES,
Lin Offshore Engineering, Inc., San Francisco, CA. (Assignee).
For primary bibliographic entry see Field 8C.
W78-02891

8G. Materials

PRESSURE TESTS IN FLOOD-CONTROL CONDUIT, MELVERN DAM, KANSAS,
Army Engineer Waterways Experiment Station, Vicksburg, MS.
For primary bibliographic entry see Field 8B.
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For primary bibliographic entry see Field 5C.
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W78-02885

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University of Wisconsin, Water Resources Economics	W78-03042--03054 03081 03083--03086	18
B. OTHER		
Army Engineer Waterways Experiment Station	W78-02754--02785	32

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B. OTHER (CONTINUED)		
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